Final Examinations 2020

on Trigonometry and Geometry

Model 1

Answer the following questions :

1 Choose the correct answer from those given :

1 $\tan 45° =$ ....

(a) 1 (b) $2\sqrt{2}$ (c) $\frac{1}{2}$ (d) $\sqrt{2}$

2 If $\sin X = \frac{1}{2}$, X is an acute angle , then m ($\angle$ X) = ...

(a) 45° (b) 60° (c) 30° (d) 90°

3 The distance between the two points (3 , 0) and (0 , – 4) equals .... length units.

(a) 4 (b) 5 (c) 6 (d) 7

4 If $x + y = 5$, $k x + 2 y = 0$ are perpendicular , then k = ...

(a) – 2 (b) – 1 (c) 1 (d) 2

5 If A (5 , 7) , B (1 , – 1) , then the midpoint of $\overline{AB}$ is ....

(a) (2 , 3) (b) (3 , 3) (c) (3 , 2) (d) (3 , 4)

6 The equation of the straight line which passes through the point (3 , – 5) and parallel to y-axis is ....

(a) $x = 3$ (b) $y = -5$ (c) $y = 2$ (d) $x = -5$

2 [a] **Without using calculator , prove that :** $\sin 60° = 2 \sin 30° \cos 30°$

[b] **Prove that :** The points A (– 3 , – 1) , B (6 , 5) and C (3 , 3) are collinear.

3 [a] If $4 \cos 60° \sin 30° = \tan x$, find the value of x , where x is an acute angle.

[b] If the midpoint of $\overline{AB}$ is C (6 , – 4) where A (5 , – 3) , **find the point :** B

4 [a] If the straight line L_1 passes through the points (3 , 1) , (2 , k) and the straight line L_2 makes with the positive direction of the x-axis an angle of measure 45° , find the value of k if $L_1 // L_2$

[b] ABC is a right-angled triangle at C , AC = 6 cm. , BC = 8 cm.

Find : 1 $\cos A \cos B - \sin A \sin B$

2 m ($\angle$ B)

5 **[a]** Find the equation of the straight line whose slope is 2 and passes through the point (1 , 0)

[b] **Prove that :** The points A (3 , – 1) , B (– 4 , 6) and C (2 , – 2) which belongs to an orthogonal Cartesian coordinates plane lie on the circle whose centre is M (– 1 , 2) Find the circumference of the circle.

Model 2

Answer the following questions :

1 **Choose the correct answer from those given :**

1 $2 \sin 30° \tan 60° =$ ....

(a) $\sqrt{3}$ (b) 3 (c) $\frac{\sqrt{3}}{3}$ (d) $\frac{1}{2}$

2 The equation of the straight line which passes through the point (– 2 , – 3) and parallel to X-axis is ....

(a) $X = -2$ (b) $X = -3$ (c) $y = -2$ (d) $y = -3$

3 If $\cos X = \frac{\sqrt{3}}{2}$, X is an acute angle , then $\sin 2X =$ ....

(a) 1 (b) $\frac{\sqrt{3}}{2}$ (c) – 2 (d) $\frac{1}{\sqrt{3}}$

4 A circle of centre at the origin point and its radius length is 2 length units , which of the following points belongs to the circle ?

(a) (1 , – 2) (b) $(-2 , \sqrt{5})$ (c) $(\sqrt{3} , 1)$ (d) (0 , 1)

5 The perpendicular distance between the two straight lines : $X - 2 = 0$, $X + 3 = 0$ equals .... length units.

(a) 1 (b) 5 (c) 2 (d) 3

6 If $\frac{-3}{2}$, $\frac{6}{k}$ are the slopes of two parallel straight lines , then k = ...

(a) 6 (b) – 4 (c) $\frac{3}{2}$ (d) 2

2 **[a]** If $\cos E \tan 30° = \cos^2 45°$, find m (∠ E) , E is an acute angle.

[b] Show the type of the triangle whose vertices are A (3 , 3) , B (1 , 5) and C (1 , 3) due to its side lengths.

3 **[a]** Find the equation of the straight line which passes through the points (1 , 3) and (– 1 , – 3) and prove that it is passing through the origin point.

[b] If the point (3 , 1) is the midpoint of (1 , y) , (X , 3) , find the point (X , y)

4 [a] Find the equation of the straight line which intercepts the two axes two positive parts of lengths 1 and 4 for x and y axes respectively and find its slope.

[b] ABC is a right-angled triangle at B , AC = 10 cm. and BC = 8 cm.

Prove that : $\sin^2 A + 1 = 2\cos^2 C + \cos^2 A$

5 [a] **Prove that :** The straight line which passes through the points $(-1, 3)$, $(2, 4)$ is parallel to the straight line : $3y - x - 1 = 0$

[b] ABCD is a trapezium , $\overline{AD} \parallel \overline{BC}$, $m(\angle B) = 90°$, AB = 3 cm. , BC = 6 cm. and AD = 2 cm.

Find the length of $\overline{DC}$ and the value of $\cos(\angle BCD)$

Model for the merge students

Answer the following questions :

1 Put (✓) or (✗) :

1. The distance between the points $(9, 0)$, $(4, 0)$ equals 5 length units. ( )
2. If $\tan E = 1$, then $m(\angle E) = 45°$ ( )
3. The straight line $y = 2x + 1$ intercepts a part of length -1 from y-axis ( )
4. If $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$, then the slope of $\overleftrightarrow{AB}$ $\times$ the slope of $\overleftrightarrow{CD} = 1$
   (both of $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ aren't parallel to any axis) ( )
5. $\tan 60° = \frac{1}{\sqrt{3}}$ ( )
6. If $A(1, 2)$, $B(3, 4)$, then the midpoint of $\overline{AB}$ is $(2, 3)$ ( )

2 Choose the correct answer from those given :

1. The distance between the point $(4, 3)$ and x-axis is .... length units.
   (a) -3 (b) 3 (c) 4 (d) -4
2. $4 \cos 30° \tan 60° =$ ....
   (a) 3 (b) $2\sqrt{3}$ (c) 6 (d) 12
3. If $x + y = 5$, $kx + 2y = 0$ are parallel, then $k =$ ....
   (a) -2 (b) -1 (c) 1 (d) 2
4. The points $(0, 1)$, $(3, 0)$ and $(0, 4)$ ....
   (a) form a right-angled triangle. (b) form an acute-angled triangle.
   (c) form an obtuse-angled triangle. (d) are collinear.
5. If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB} = \frac{2}{3}$, then the slope of $\overleftrightarrow{CD} =$ ....
   (a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) $\frac{-2}{3}$ (d) $\frac{-3}{2}$
6. If $\sin x = \frac{1}{2}$, x is an acute angle, then $\sin 2x =$ ....
   (a) 1 (b) $\frac{1}{4}$ (c) $\frac{\sqrt{3}}{2}$ (d) $\frac{1}{\sqrt{3}}$

3 Join from column (A) to column (B) :

(A)	(B)
1 The slope of the straight line which is parallel to X-axis is	• 10
2 $\sin^2 30° + \cos^2 30° =$	• 0
3 If ABCD is a rectangle where A (– 1 , – 4) , C (5 , 4) , then the length of $\overline{BD}$ = ... length units.	• 1
4 The equation of the straight line which passes through the origin point and its slope is 2 is y = ... X	• – 3
5 The equation of the straight line which passes through the point (2 , – 3) and parallel to X-axis is y = ...	• 2
6 The value of : $\frac{2 \tan 30°}{1 + \tan^2 30°}$ = ...	• $\frac{\sqrt{3}}{2}$

4 Complete the following :

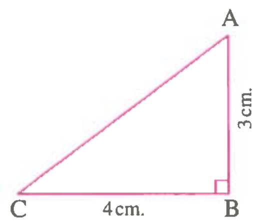
1 If $\overline{AB}$ // $\overline{CD}$ and the slope of $\overleftrightarrow{AB} = \frac{1}{2}$, then the slope of $\overleftrightarrow{CD}$ = ...

2 **In the opposite figure :**

ABC is a right-angled triangle at B

, AB = 3 cm. and BC = 4 cm.

, then sin C = ...



3 If the point (0 , a) belongs to the straight line : $3X - 4y = -12$, then a = ...

4 If $X \cos 60° = \tan 45°$, then X = ...

5 The distance between the point (4 , 3) and the origin point in the coordinates plane is ....

6 If the origin point is the midpoint of $\overline{AB}$ where A (5 , – 2)

, then B (............... , ...)

1 Cairo Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer from those given :

1 If $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB} = \frac{1}{2}$, then the slope of $\overleftrightarrow{CD} =$ ....

(a) 2 (b) $\frac{1}{2}$ (c) $-\frac{1}{2}$ (d) -2

2 The number of symmetry axes of an isosceles triangle equals ....

(a) 1 (b) 2 (c) 3 (d) 4

3 $\tan 60° \tan 30° =$ ....

(a) $\sin 30°$ (b) $\tan 30°$ (c) $\tan 45°$ (d) $\cos 60°$

4 The sum of the measures of the interior angles of the quadrilateral equals ....

(a) 540° (b) 360° (c) 180° (d) 90°

5 The equation of the straight line which passes through the point (2 , 3) and is parallel to X-axis is ....

(a) $X = 2$ (b) $X = 3$ (c) $y = 2$ (d) $y = 3$

6 The perimeter of the square whose surface area is 100 cm^2 equals .... cm.

(a) 10 (b) 20 (c) 40 (d) 50

2 **[a]** If $X \sin 45° \cos 45° = \sin 30°$, find the value of X (Showing the steps of the solution).

[b] Find the equation of the straight line which its slope is 2 and passes through the point (1 , 0)

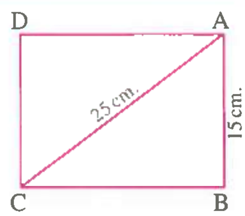
3 **[a]** XYZ is a right-angled triangle at Y in which XY = 6 cm. , YZ = 8 cm.

Find the value of : $\cos X \cos Z - \sin X \sin Z$

[b] ABCD is a quadrilateral , where A (2 , 4) , B (– 3 , 0) , C (– 7 , 5) , D (– 2 , 9)

Prove that : The figure ABCD is a square.

4 **[a] In the opposite figure :**



ABCD is a rectangle , AB = 15 cm.

, AC = 25 cm.

Find : 1 The length of $\overline{BC}$ 2 m (∠ ACB)

3 The area of the rectangle ABCD

[b] If C (6 , – 4) is the midpoint of $\overline{AB}$ where A (5 , – 3) , find the coordinates of the point B

5 [a] If the straight line whose equation is a $X + 2y - 7 = 0$ is parallel to the straight line which makes an angle of measure 45° with the positive direction of X-axis , find the value of a

[b] Find the equation of the straight line which passes through the two points (4 , 2) , (– 2 , – 1) , then prove that it passes through the origin point.

2 Giza Governorate

Answer the following questions :

1 **Choose the correct answer :**

1 If $\sin X = \frac{1}{2}$ where X is an acute angle , then $\sin 2X =$ ....

(a) $\frac{1}{4}$ (b) 1 (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{\sqrt{3}}{2}$

2 The distance between the point (4 , 3) and y-axis equals .... length unit.

(a) – 3 (b) – 4 (c) 3 (d) 4

3 The points (8 , 0) , (0 , 6) , (0 , 0) ....

(a) form a right-angled triangle. (b) form an obtuse-angled triangle.
(c) form an acute-angled triangle. (d) are collinear.

4 If A (5 , 7) , B (1 , – 1) , then the midpoint of $\overline{AB}$ is ....

(a) (2 , 3) (b) (3 , 3) (c) (3 , 2) (d) (3 , 4)

5 The equation of the straight line which passes through the point (1 , – 3) and is parallel to X-axis is ....

(a) $X = 3$ (b) $y = 1$ (c) $y = -3$ (d) $X = -3$

6 The opposite figure represents a quarter of a circle with radius 2 cm. long , then its perimeter = ... cm.


2 cm.

(a) 2π (b) 5π
(c) $\pi + 4$ (d) $4\pi + 4$

2 [a] Find the equation of the straight line which its slope is 2 and passes through the point (1 , – 1)

[b] ABC is a right-angled triangle at C in which AC = 3 cm. , BC = 4 cm. **Find :**

1 $\cos A \cos B - \sin A \sin B$ 2 m (∠ B)

3 [a] **Without using calculator , prove that :** $\sin 60° = 2 \sin 30° \cos 30°$

[b] If the straight line L_1 passes through the two points (3 , 1) , (2 , k) and the straight line L_2 makes with the positive direction of the X-axis an angle of measure 45° , find the value of k if $L_1 \perp L_2$

4 **[a]** If $\cos E \tan 30° = \cos^2 45°$, then find m ($\angle$ E) where E is an acute angle.

[b] Show the type of the triangle whose vertices are the points :
A (3 , 3) , B (1 , 5) , C (1 , 3) with respect to its side lengths.

5 **[a]** Find the slope of the straight line $5x + 4y + 10 = 0$, then find the length of the y-intercept.

[b] Prove that the points A (3 , – 1) , B (– 4 , 6) , C (2 , – 2) which belong to a perpendicular coordinates plane passing through the circle whose centre is the point M (– 1 , 2) , then find the area of the circle.

3 Alexandria Governorate

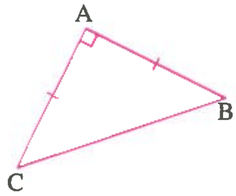
Answer the following questions : ***(Calculators are permitted)***

1 **Choose the correct answer from those given :**

1 If $\overleftrightarrow{AB} \,//\, \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB} = \frac{2}{3}$, then the slope of $\overleftrightarrow{CD} =$ ....

(a) $\frac{3}{2}$ (b) $\frac{2}{3}$ (c) $\frac{-3}{2}$ (d) $\frac{-2}{3}$

2 **In the opposite figure :**



ABC is an isosceles triangle and a right-angled triangle at A

, then tan C = ...

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{1}{\sqrt{3}}$ (c) 1 (d) $\frac{1}{2}$

3 If A , B are two acute angles and m ($\angle$ A) + m ($\angle$ B) = 90° , m ($\angle$ A) $\neq$ m ($\angle$ B)
, then ....

(a) sin A = cos B (b) sin A = sin B

(c) tan A = tan B (d) cos A = cos B

4 A circle of centre at the origin point and its radius length is 2 length unit , then the point .... belongs to it.

(a) (1 , – 2) (b) $\left(-2 , \sqrt{5}\right)$ (c) (0 , 1) (d) $\left(\sqrt{3} , 1\right)$

5 If X , Y are two supplementary angles and m ($\angle$ X) = m ($\angle$ Y) , then m ($\angle$ X) = ...°

(a) 30 (b) 45 (c) 60 (d) 90

6 The parallelogram whose diagonals are equal in length and perpendicular is the ....

(a) square. (b) rhombus. (c) rectangle. (d) trapezium.

2 **[a] Find the value of X which satisfies :** $X \sin 30° \cos^2 45° = \sin^2 60°$

[b] ABCD is a parallelogram where A $(3, 2)$, B $(4, -5)$, C $(0, -3)$ Find the two coordinates of the point at which the two diagonals intersect , then find the coordinates of the point D

3 **[a]** Prove that the points A $(3, -1)$, B $(-4, 6)$ and C $(2, -2)$ are located on a circle whose centre is the point M $(-1, 2)$, then find the circumference of the circle. $(\pi = 3.14)$

[b] Find the equation of the straight line which is perpendicular to the straight line whose equation is $X + 2y + 5 = 0$ and intercepts a positive part from y-axis that is equal to 7 units.

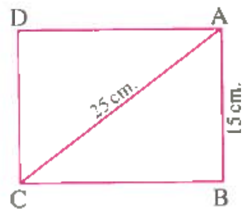
4 **[a]** Prove that the straight line passing through the two points $(-3, -2)$, $(4, 5)$ is parallel to the straight line that makes with the positive direction of the X-axis an angle of measure 45°

[b] ABC is a right-angled triangle at C , AC = 6 cm. , BC = 8 cm.

Find the value of : $\cos A \cos B - \sin A \sin B$

5 **[a]** Let A $(4, -6)$, B $(3, 7)$ and C $(1, -3)$ Find the equation of the straight line which passes through A and the midpoint of $\overline{BC}$

[b] In the opposite figure :



ABCD is a rectangle where AB = 15 cm.

, AC = 25 cm.

Find : 1 m (∠ ACB)

2 The surface area of the rectangle ABCD

4 El-Kalyoubia Governorate

Answer the following questions :

1 **Choose the correct answer :**

1 If $\cos \frac{X}{2} = \frac{1}{2}$ where $\frac{X}{2}$ is the measure of a positive acute angle , then $X =$ .... °

(a) 30 (b) 90 (c) 60 (d) 120

2 The triangle whose area is 24 cm^2 and its height is 8 cm. , then the length of the base corresponding to this height is .... cm.

(a) 16 (b) 6 (c) 3 (d) 2

3 If $\overleftrightarrow{CD}$ is parallel to y-axis where C (k , 4) , D (– 5 , 7) , then k = ...

(a) 5 (b) 7 (c) – 5 (d) 4

4 The equation of the straight line passing through the origin point and its slope = 1 is ....

(a) $y = x$ (b) $y = -x$ (c) $y = 2x$ (d) $y = 0$

5 If the point (0 , a) belongs to the straight line $3x - 4y + 12 = 0$, then a = ...

(a) 4 (b) – 3 (c) 3 (d) – 4

6 In Δ ABC , if $(AB)^2 > (BC)^2 + (AC)^2$, then $\angle$ C is .... angle.

(a) an acute (b) a right (c) an obtuse (d) a straight

2 [a] If the distance of the point $(x , 5)$ from the point (6 , 1) equals $2\sqrt{5}$ length unit , then find the value of x

[b] **Without using the calculator , find the numerical value of the expression :**

$\sin 45° \cos 45° + \sin 30° \cos 60° - \cos^2 30°$

3 [a] ABCD is a parallelogram where A (3 , 2) , B (4 , – 5) , C (0 , – 3)

Find the two coordinates of the point at which the two diagonals intersect , then find the coordinates of the point D

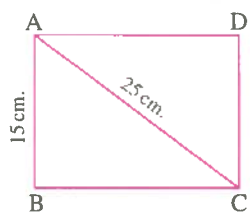
[b] ABC is a right-angled triangle at B in which AC = 10 cm. , BC = 8 cm.

Prove that : $\sin^2 A + 1 = 2\cos^2 C + \cos^2 A$

4 [a] If the straight line L_1 passes through the two points (3 , 1) and (2 , k) and the straight line L_2 makes with the positive direction of the x-axis an angle of measure 45° , then find k if $L_1 \parallel L_2$

[b] Find the equation of the straight line passing through the point (1 , 2) and perpendicular to the straight line $x + 3y + 7 = 0$

5 [a] **In the opposite figure :**



ABCD is a rectangle in which

AB = 15 cm. and AC = 25 cm.

Find : 1 m ($\angle$ ACB)

2 The surface area of the rectangle ABCD

[b] Find the equation of the straight line which intersects from the x and y axes two positive parts whose lengths are 4 and 9 length units respectively.

5 El-Sharkia Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer from those given :

1. If $\cos(X + 25°) = \frac{1}{2}$, X is the measure of an acute angle , then $X =$ ....°
   (a) 20 (b) 35 (c) zero (d) 5
2. The straight line whose equation is $3y = 2X - 6$, its slope = ...
   (a) 2 (b) $\frac{2}{3}$ (c) 6 (d) $\frac{3}{2}$
3. The equation of the straight line which passes through the origin point and makes with the positive direction of X-axis an angle of measure 60° is ....
   (a) $X = 3y$ (b) $y = \sqrt{3}X + 2$ (c) $y = 3X$ (d) $y = \sqrt{3}X$
4. If ABC is a right-angled triangle at B and $\sin A = \frac{2}{7}$, then $\cos C =$ ....
   (a) $\frac{2}{7}$ (b) $\frac{3}{7}$ (c) $\frac{4}{7}$ (d) $\frac{5}{7}$
5. The distance between the point $A(\sqrt{2}, 4)$ and the origin point equals .... length unit.
   (a) $\sqrt{2}$ (b) $2\sqrt{2}$ (c) $3\sqrt{2}$ (d) $4\sqrt{2}$
6. If the slope of the straight line L_1 is $\frac{a}{5}$ and the slope of the straight line L_2 is $\frac{-b}{3}$ where $a , b \neq 0$ and $L_1 \perp L_2$, then $a\,b =$ ....
   (a) $\frac{3}{5}$ (b) $\frac{-3}{5}$ (c) 15 (d) -15

2

[a] Without using the calculator , prove that : $\frac{\sin 30° \sin 60°}{\sin 45° \cos 45°} = \cos 30°$

[b] Prove that the points A (3 , – 1) , B (– 4 , 6) , C (2 , – 2) which belong to an orthogonal Cartesian coordinates plane lie on the circle whose centre is M (– 1 , 2) , then find the circumference of the circle.

3

[a] If A (5 , 1) , B (3 , – 7) , C (1 , 3) are three noncollinear points , find the equation of the straight line which passes through the point A and is parallel to $\overleftrightarrow{BC}$

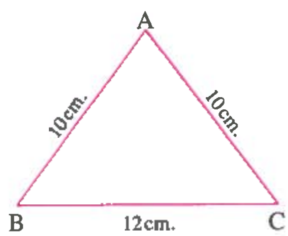
[b] In the opposite figure :

ABC is an isosceles triangle where

AB = AC = 10 cm. , BC = 12 cm.

Find : 1. sin B

2. The area of the triangle ABC



4 **[a]** If ABCD is a parallelogram , A (3 , 3) , B (2 , – 2) , C (5 , – 1)

, **find :** 1 The coordinates of the point of intersection of the two diagonals.

2 The coordinates of the point D

[b] Find the equation of the straight line which passes through the two points (4 , 5) , (0 , 3) , then find the coordinates of the intersection point of the straight line with x-axis.

5 **[a]** If $\cos x = \sin 30° \cos 60°$

, **find :** 1 The measure of angle x (where x is an acute angle).

2 $\tan x$

[b] Find the equation of the straight line which cuts 3 units from the positive part of y-axis and is perpendicular to the straight line $\frac{x}{2} + \frac{y}{3} = 1$

6 El-Monofia Governorate

Answer the following questions : ***(Using calculator is permitted)***

1 **Choose the correct answer :**

1 If $\cos (x + 15)° = \frac{1}{2}$, then $\sin (75 - x)° =$ ....

(a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) 1

2 A circle is drawn inside a square where the circle touches its four sides. If the perimeter of the square is 56 cm. , then the surface area of the circle is .... cm^2.

(a) $\frac{77}{2}$ (b) 77 (c) 112 (d) 154

3 The number of sides of the regular polygon in which the measure of one of its interior angles is 144° equals .... sides.

(a) 7 (b) 8 (c) 9 (d) 10

4 An isosceles triangle , the lengths of its sides may be 4 cm. , 9 cm. , ... cm.

(a) 4 (b) 9 (c) 13 (d) 36

5 The distance between the point (– 2 , – 3) and x-axis equals .... length units.

(a) 2 (b) 3 (c) – 2 (d) – 3

6 The equation of the straight line which its slope = $\frac{1}{2}$ and cuts the y-axis at the point (0 , 3) is ....

(a) $2y = \frac{1}{2}x + 6$ (b) $y = \frac{1}{2}x$

(c) $y = \frac{1}{2}x + 3$ (d) $2y = \frac{1}{2}x + 3$

2 [a] **Without using calculator , find the numerical value of the expression :**

$\sin 30° \cos 60° + \cos 30° \sin 60° - \tan^2 45°$

[b] $\overline{AB}$ is a diameter in circle M , if A (7 , – 3) and B (5 , 1) where $\pi = 3.14$, **find :**

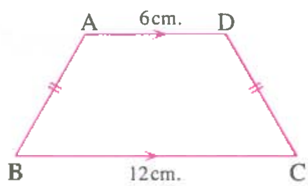
1. The surface area of the circle.
2. The coordinates of the centre of circle M

3 [a] ABC is a right-angled triangle at A , AB = 5 cm. and BC = 13 cm.

Find the numerical value of the expression : $\sin C \cos B + \cos C \sin B$

[b] Find the equation of the straight line which passes through the point (1 , 3) and is perpendicular to the straight line passing through the two points (5 , 0) and (2 , 1)

4 [a] **In the opposite figure :**



ABCD is an isosceles trapezium , its area = 36 cm.^{2}

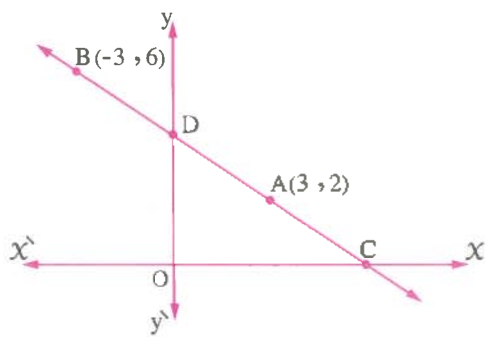
, $\overline{AD}$ // $\overline{BC}$, AD = 6 cm. and BC = 12 cm.

Find the value of : $\sin B + \cos C$

[b] Show the type of the triangle ABC according to its angles measures if its vertices are A (– 1 , 3) , B (5 , 1) and C (6 , 4)

5 [a] Find the slope of the straight line and the length of the intercepted part from y-axis where its equation is $4x + 5y - 10 = 0$

[b] **In the opposite figure :**



$\overleftrightarrow{CD}$ passes through the two points A (3 , 2) , B (– 3 , 6) and cuts the two axes at C and D respectively.

Find with the proof :

1. The equation of $\overleftrightarrow{CD}$
2. The area of the triangle DOC where O is the origin point.

7 El-Gharbia Governorate

Answer the following questions : *(Calculator is allowed)*

1 **Choose the correct answer :**

1. The perpendicular distance between the two straight lines $y - 4 = 0$ and $y + 5 = 0$ equals .... length units.

(a) 1 (b) 5 (c) 9 (d) 4

2 The equation of the straight line passing through the point (3 , – 2) and parallel to X-axis is ....

(a) $X = 3$ (b) $y = 2$ (c) $y = -2$ (d) $X + y = 1$

3 If the straight line whose equation is $y = k X + 1$ is parallel to the straight line whose equation is $2y - X = 0$, then k = ...

(a) 1 (b) $\frac{1}{2}$ (c) 2 (d) – 2

4 If the lengths 3 , 7 , ℓ are lengths of sides of a triangle , then ℓ can be equal to ....

(a) 3 (b) 7 (c) 4 (d) 10

5 The image of the point (– 3 , 5) by reflection on the y-axis is ....

(a) (3 , 5) (b) (5 , 3) (c) (– 5 , 3) (d) (– 3 , – 5)

6 If ABC is a right-angled triangle at B , then $\frac{\sin A}{\cos C}$ = ...

(a) $\frac{3}{5}$ (b) $\frac{4}{3}$ (c) $\frac{3}{4}$ (d) 1

2 **[a]** If $\tan X = 4 \cos 60° \sin 30°$, then find the value of X where X is the measure of an acute angle.

[b] If the triangle XYZ whose vertices are X (3 , 5) , Y (4 , 2) , Z (– 5 , a) is a right-angled triangle at Y

, **find :** 1 The value of a

2 The surface area of the triangle XYZ

3 **[a]** If the ratio between the two measures of two supplementary angles is 3 : 5 , find the degree measure for each of them by degrees and minutes.

[b] Find the equation of the straight line passing through the point (– 1 , 2) and perpendicular to the straight line $X + y = 5$

4 **[a]** Prove that the points A (3 , – 1) , B (– 4 , 6) , C (2 , – 2) which belong to an orthogonal Cartesian coordinates plane lie on one circle whose centre is the point M (– 1 , 2) , then find the circumference in terms of π

[b] ABCD is a trapezium in which $\overline{AD} \parallel \overline{BC}$, m (∠ B) = 90° , AB = 3 cm. , AD = 6 cm. , BC = 10 cm. **Find the value of :** cos (∠ DCB) – tan (∠ ACB)

5 **[a]** ABCD is a parallelogram in which A (3 , 2) , B (4 , – 5) , C (0 , – 3)

Find : 1 The coordinates of the intersection point of the two diagonals.

2 The coordinates of the vertex point D

[b] In the opposite figure :

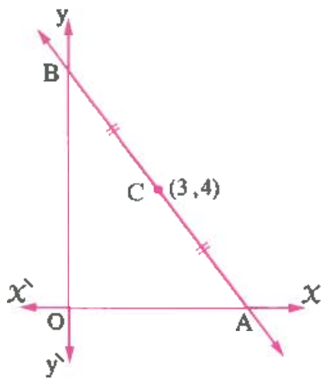
The point C is the midpoint of $\overline{AB}$

where C (3 , 4) , O is the origin point

in the perpendicular coordinate system.

Find : 1 The coordinates of the two points A and B

2 The equation of $\overleftrightarrow{AB}$



8 El-Dakahlia Governorate

Answer the following questions : ***(Calculator is permitted)***

1 **[a] Choose the correct answer from those given :**

1 ABC is a triangle , m (∠ A) = 85° , sin B = cos B , then m (∠ C) = ...

(a) 30° (b) 45° (c) 50° (d) 60°

2 The area of the triangle bounded by the straight lines $X = 0$, $y = 0$, $3X + 2y = 12$ equals .... square units.

(a) 6 (b) 12 (c) 4 (d) 5

3 If the straight line passing through the two points (1 , y) , (3 , 4) its slope equals tan 45° , then y = ...

(a) 1 (b) 2 (c) – 1 (d) 4

[b] ABCD is an isosceles trapezium such that $\overline{AD} \,//\, \overline{BC}$, AD = 4 cm. , AB = 5 cm. , BC = 12 cm. **Find the value of :** $\dfrac{\tan B \times \cos C}{\sin^2 C + \cos^2 B}$

2 **[a] Choose the correct answer from those given :**

1 The straight line $a X + (2 - a)\, y = 5$ is parallel to the straight line passing through the two points (1 , 4) , (3 , 5) , then a = ...

(a) 3 (b) – 2 (c) 6 (d) 4

2 ABC is a triangle , 2 m (∠ C) = m (∠ A) + m (∠ B) , then m (∠ C) = ...°

(a) 30 (b) 60 (c) 45 (d) 90

3 The straight line $\dfrac{X}{2} - \dfrac{y}{3} = 6$ cuts the X-axis at a part with length .... units.

(a) 3 (b) 2 (c) 6 (d) 12

[b] $\overline{AB}$ is a diameter of circle M , B (8 , 11) , M (5 , 7) **Find :**

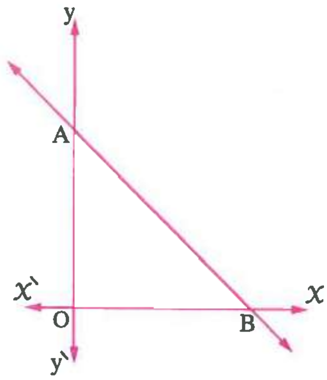
1 The circumference of the circle.

2 The equation of the straight line perpendicular to $\overline{AB}$ from point A

3 **[a] Prove that the quadrilateral ABCD whose vertices are :**

A (– 1 , 3) , B (5 , 1) , C (7 , 4) , D (1 , 6) is a parallelogram.

[b] The opposite figure represents the straight line $\overleftrightarrow{AB}$ whose equation is $y = k\,x + c$ and cuts the two axes with two equal parts and passes through the point (2 , 3) **Find :**



1 The values of k , c

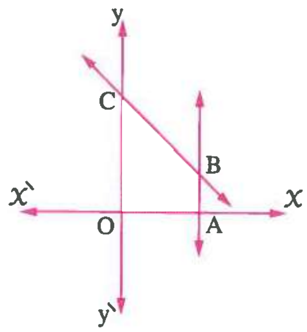
2 The area of the triangle ABO

4 **[a] In the opposite figure :**

The straight line $\overleftrightarrow{AB}$ is parallel to y-axis.

The straight line $\overleftrightarrow{BC}$ its equation is $y = -x + 3$

, the point B (2 , 1) **Find :**



1 The length of $\overline{BC}$

2 The area of the figure OABC

3 m (∠ OCB)

[b] ABC is a right-angled triangle at B

1 **Prove that :** $\sin^2 A + \cos^2 A = 1$

2 If AB = 5 cm. , AC = 13 cm. , **find :** m (∠ C) to the nearest minute.

5 **[a]** Find the equation of the straight line passing through the point (3 , 4) and makes with the positive direction of x-axis an angle of measure 135°

[b] Without using calculator , prove that :

$\tan^2 60° - \tan^2 45° = \sin^2 60° + \cos^2 60° + 2 \sin 30°$

9 Ismailia Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer from those given :

1 The number of axes of symmetry of the scalene triangle equals ....

(a) zero (b) 1 (c) 2 (d) 3

2 The midpoint of $\overline{AB}$ where A (6 , 0) , B (0 , 4) is ....

(a) (6 , 4) (b) (4 , 6) (c) (3 , 2) (d) (2 , 3)

3 If the lengths of two sides of a triangle are 3 cm. and 4 cm. , then the length of the third side may be .... cm.

(a) 1 (b) 6 (c) 7 (d) 8

4 If $\tan 2X = \frac{1}{\sqrt{3}}$ where $2X$ is the measure of an acute angle , then $X =$ .... °

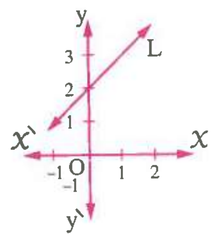
(a) 15 (b) 30 (c) 45 (d) 60

5 When you stand in front of the mirror and see your image , this is called in mathematics ....

(a) rotation. (b) translation. (c) reflection. (d) similarity.

6 **In the opposite figure :**

Which of the following represents the equation of the straight line L ?



(a) $y = X$

(b) $y = 2$

(c) $y + X = 2$

(d) $y - X = 2$

2 [a] **Without using the calculator , find the value of X if :**

$X \cos^2 30° = \tan^2 60° \cos^2 45°$

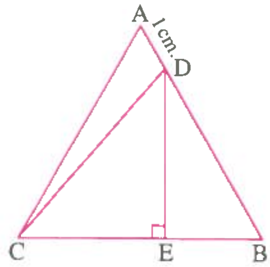
[b] If A (5 , – 1) , B (3 , 7) , C (1 , – 3) , find the equation of the straight line which passes through the midpoint of $\overline{BC}$ and the point A

3 [a] Prove that the points A (1 , – 2) , B (– 4 , 2) , C (1 , 6) are the vertices of an isosceles triangle.

[b] ABC is a right-angled triangle at B , find the value of : $\frac{\sin A}{\cos C}$ and if $\tan D = \frac{\sin A}{\cos C}$ where D is an acute angle , **find :** m (∠ D)

4 [a] If the straight line L_1 passes through the two points (k , 1) , (2 , 4) and the straight line L_2 makes with the positive direction of X-axis an angle of measure 45°
, find the value of k if the two straight lines are parallel.

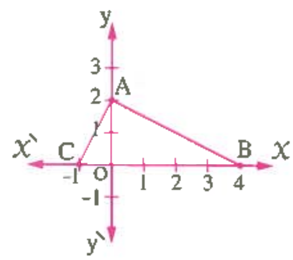
[b] **In the opposite figure :**



ABC is an equilateral triangle of side length 5 cm.
, D ∈ $\overline{AB}$ where AD = 1 cm. , $\overline{DE} \perp \overline{BC}$
Find : tan (∠ DCE)

5 [a] If ABCD is a rhombus where A (3 , 3) , C (– 3 , – 3)
, **find :** 1 The intersection point of the diagonals.
2 The equation of $\overleftrightarrow{BD}$

[b] **In the opposite figure :**



A triangle ABC is drawn in the orthogonal Cartesian coordinates plane.
Prove that : Δ ABC is a right-angled triangle and find its area.

10 Suez Governorate

Answer the following questions : *(Calculator is allowed)*

1 **Choose the correct answer from those given :**

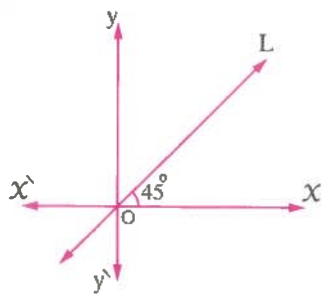
1 $\sin^2 60° + \cos^2 60° =$ ....

(a) 0 (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) 1

2 ABCD is a parallelogram in which m (∠ A) + m (∠ C) = 200°
, then m (∠ B) = ... °

(a) 80 (b) 50 (c) 100 (d) 160

3 **In the figure opposite :**



The equation of the straight line L is ....

(a) $X = 1$

(b) $y = -X$

(c) $y = X$

(d) $y = 1$

4 If a , b are the measures of two complementary angles where a : b = 1 : 2 , then b = ...°

(a) 180 (b) 90 (c) 30 (d) 60

5 The perpendicular distance between the straight lines $x - 2 = 0$, $x + 3 = 0$ equals .... length units.

(a) 1 (b) 5 (c) 2 (d) 3

6 If A (0 , 0) , B (5 , 7) , C (5 , h) are the vertices of a right-angled triangle at C , then h = ...

(a) 0 (b) 5 (c) 7 (d) – 5

2 [a] **Without using calculator , prove that :**

$2 \sin 30° + 4 \cos 60° = \tan^2 60°$

[b] If A (– 1 , – 1) , B (2 , 3) , C (6 , 0) , D (3 , – 4) are four points on an orthogonal Cartesian coordinates plane

, **prove that :** $\overline{AC}$ and $\overline{BD}$ bisect each other.

3 [a] If $\cos 3x = \frac{\sin 60° \sin 30°}{\tan 45° \sin^2 45°}$, find the value of x where $3x$ is an acute angle.

[b] Find the equation of the straight line passing through the point (1 , 2) and perpendicular to the straight line passing through the two points A (2 , – 3) , B (5 , – 4)

4 [a] ABC is a right-angled triangle at C where AB = 5 cm. , BC = 4 cm.

Prove that : sin A cos B + cos A sin B = 1

[b] Find the equation of the straight line whose slope is equal to the slope of the straight line $\frac{y-1}{x} = \frac{1}{3}$ and intersects a part from the negative direction of y-axis of length 3 units.

5 [a] ABC is a triangle where A (0 , 0) , B (3 , 4) , C (– 4 , 3)

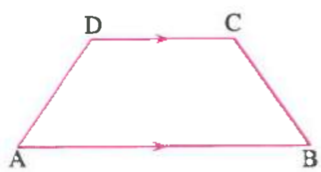
Find the perimeter of Δ ABC

[b] **In the opposite figure :**

ABCD is a trapezoid , $\overline{AB} // \overline{CD}$

, A (9 , – 2) , B (3 , 2) , C ($-x$, $-x$) , D (4 , – 3)

Find the coordinates of the point C



11 Port Said Governorate

Answer the following questions :

1 Choose the correct answer from those given :

1 If $\frac{-2}{3}$, $\frac{k}{6}$ are the slopes of two perpendicular straight lines , then k = ...

(a) 9 (b) 4 (c) – 9 (d) – 4

2 The distance between the two points (15 , 0) , (6 , 0) equals .... unit length.

(a) – 9 (b) 9 (c) 3 (d) – 3

3 ABC is a right-angled triangle at C , AB = 25 cm. , AC = 15 cm.

, then the area of the surface of the triangle ABC is .... cm^2.

(a) 300 (b) 75 (c) 150 (d) 375

4 If $\overleftrightarrow{CD}$ is parallel to the y-axis where C (m , 4) , D (– 5 , 7) , then m = ...

(a) 5 (b) – 5 (c) – 7 (d) 7

5 If the point of the origin is the midpoint of $\overline{AB}$, where A (5 , – 2) , then the point B is ....

(a) (2 , 5) (b) (5 , – 2) (c) (– 2 , – 5) (d) (– 5 , 2)

6 If $\tan(X + 10) = \sqrt{3}$ where X is the measure of an acute angle , then X = ...

(a) 40° (b) 50° (c) 60° (d) 70°

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2 **[a]** Prove that the straight line which passes through the points (– 1 , 3) , (2 , 4) is parallel to the straight line $3y - X - 1 = 0$

[b] Without using calculator , prove that :

$\sin 90° = \sin 60° \cos 30° + \cos 60° \sin 30°$

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3 **[a]** If $\cos E = \frac{\cos^2 45°}{\tan 30°}$, find m (∠ E) , E is an acute angle.

[b] Prove that the points A (– 3 , 0) , B (3 , 4) , C (1 , – 6) are the vertices of an isosceles triangle.

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4 **[a]** Find the equation of the straight line whose slope is equal to the slope of the straight line $\frac{y-1}{X} = \frac{1}{3}$ and intercepts a negative part from the y-axis that is equal to 3 units.

[b] ABCD is a quadrilateral , where A (2 , 3) , B (6 , 2) , C (– 2 , – 2) , D (– 2 , 1)

Prove that the figure ABCD is a trapezoid.

5 **[a]** If A $(5 , -6)$, B $(3 , 7)$ and C $(1 , -3)$, then find the equation of the straight line passing through the point A and the midpoint of $\overline{BC}$

[b] XYZ is a right-angled triangle at Y , where XY = 5 cm. , XZ = 13 cm.
, **find the value of :** $\sin X \cos Z + \cos X \sin Z$

12 Damietta Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from the given answers :**

1. The complement of the angle whose measure is 40° is of measure ....
   (a) 50° (b) 80° (c) 90° (d) 140°
2. If D $(6 , -4)$ is the midpoint of $\overline{AB}$ where A $(5 , -3)$, then B is ....
   (a) $(-5 , 7)$ (b) $(5 , 7)$ (c) $(7 , 5)$ (d) $(7 , -5)$
3. The length of the radius of the circle of centre $(0 , 0)$ and passes through $(3 , 4)$ equals .... length units.
   (a) 7 (b) 1 (c) 12 (d) 5
4. The slope of the straight line $X - 5 = 0$ is ....
   (a) 5 (b) $\frac{1}{5}$ (c) undefined. (d) zero
5. If $\tan(X + 10) = 1$, X is the measure of an acute angle , then $X =$ ....
   (a) 45° (b) 35° (c) 80° (d) 50°
6. The perpendicular distance between the two straight lines $X - 3 = 0$, $X + 4 = 0$ equals .... length units.
   (a) 1 (b) 5 (c) 2 (d) 7

2 **[a]** Find the equation of the straight line which passes through the points $(5 , 0)$, $(0 , 5)$

[b] ABC is a right-angled triangle at B where AB = 7 cm. , AC = 25 cm.
Find the value of the following : $\sin^2 A + \sin^2 C$

3 **[a]** If the points $(0 , 1)$, $(a , 3)$, $(2 , 5)$ are located on one straight line , then find the value of a

[b] Find the equation of the straight line passing through the point $(3 , 7)$ and parallel to the straight line $X + 3y + 5 = 0$

4 [a] **Without using the calculator , find the value of X (Where X is the measure of an acute angle) which satisfies that :** $2 \sin X = \sin 30° \cos 60° + \cos 30° \sin 60°$

[b] Find the equation of the straight line whose slope is 2 and intersects a positive part from the y-axis that equals 7 units.

5 [a] **Prove the following equality :** $\tan 60° = \frac{2 \tan 30°}{1 - \tan^2 30°}$

[b] State the kind of the triangle whose vertices are the points A (– 2 , 4) , B (3 , – 1) , C (4 , 5) with respect to its sides lenghts.

13 Kafr El-Sheikh Governorate

Answer the following questions : *(Calculator is allowed)*

1 **Choose the correct answer :**

1. The measure of an exterior angle of the equilateral triangle equals ....
   (a) 60° (b) 150° (c) 120° (d) 30°
2. If $\frac{-2}{3}$, $\frac{6}{k}$ are the slopes of two perpendicular straight lines , then k = ...
   (a) 4 (b) – 9 (c) – 4 (d) 9
3. If ABCD is a square , then m (∠ CAB) = ...
   (a) 90° (b) 45° (c) 60° (d) 630°
4. If $\sin \frac{X}{3} = \frac{1}{2}$, $\frac{X}{3}$ is the measure of an acute angle , then X = ...
   (a) 30° (b) 60° (c) 10° (d) 90°
5. The parallelogram whose two diagonals are equal in length and not perpendicular is called a ....
   (a) square. (b) rhombus. (c) rectangle. (d) trapezium.
6. The equation of the straight line which passes through the point (2 , – 3) and is parallel to X-axis is ....
   (a) $X = 2$ (b) $y = 3$ (c) $X = -2$ (d) $y = -3$

2 [a] Show the type of the triangle whose vertices are A (3 , 0) , B (1 , 4) , C (– 1 , 2) due to its side lengths.

[b] **Without using calculator , find the value of the following :**

$\sin^2 45° \cos 60° + \frac{1}{2} \tan 60° \sin 60°$

3 **[a]** If the straight line $L_1 : y = (2 - k) X + 5$ and the straight line L_2 makes with the positive direction of the X-axis an angle of measure 45°, find the value of k if $L_1 // L_2$

[b] If $\sqrt{3} \tan X = 4 \sin 60° \cos 30°$, **find :** X , where X is the measure of an acute angle.

4 **[a]** If the distance between the point $(X , 3)$ and the point $(2 , 5)$ equals $2\sqrt{2}$ length units , then find the values of X

[b] Find the equation of the straight line whose slope is 3 and passes through the point $(5 , -2)$

5 **[a]** If the midpoint of $\overline{BC}$ is A (2 , 3) , and C (– 1 , 3) , find the point B

[b] ABC is a right-angled triangle at B , sin A + cos C = 1 , **find :** m (∠ A)

14 El-Beheira Governorate

Answer the following questions : ***(Calculator is permitted)***

1 **Choose the correct answer from the given ones :**

1 If the point of origin is the midpoint of $\overline{AB}$, where A (5 , – 2) , then the point B is ……………

(a) (– 5 , – 2) (b) (5 , 2) (c) (– 5 , 2) (d) (0 , 0)

2 The angle of measure 50° is complementary with an angle of measure ……………

(a) 50° (b) 40° (c) 30° (d) 130°

3 A circle its centre is (3 , – 4) and its radius length is 5 units. Which of the following points belongs to the circle ?

(a) (– 3 , 4) (b) (0 , 0) (c) (5 , 0) (d) (0 , 4)

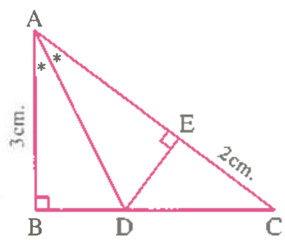
4 If $\cos \frac{X}{2} = \frac{1}{2}$ where $\frac{X}{2}$ is the measure of an acute angle , then $X =$ ……………

(a) 60° (b) 120° (c) 180° (d) 90°

5 If ABCD is a parallelogram in which m (∠ A) + m (∠ C) = 220° , then m (∠ B) = ……………

(a) 110° (b) 70° (c) 140° (d) 80°

6 **In the figure opposite :**



ABC is a right-angled triangle at B , $\overrightarrow{AD}$ bisects ∠ A , $\overline{DE} \perp \overline{AC}$, AB = 3 cm. , CE = 2 cm. , then CB = …………… cm.

(a) 2 (b) 3 (c) 4 (d) 5

2 **[a]** Prove that the straight line which passes through the two points $(-1, 3)$, $(2, 4)$ is parallel to the straight line $3y - x - 1 = 0$

[b] ABCD is a trapezium, $\overline{AD} \parallel \overline{BC}$, $m(\angle B) = 90°$, $AB = 3$ cm., $BC = 6$ cm., $AD = 2$ cm. Find the length of $\overline{DC}$ and the value of $\cos(\angle BCD)$

3 **[a]** Find the equation of the straight line whose slope is 3 and passes through the point $(1, 2)$

[b] Without using the calculator, find the value of x (Where x is the measure of an acute angle) which satisfies that :
$2 \sin x = \tan^2 60° - 2 \tan 45°$

4 **[a]** If the straight line L_1 passes through the two points $(3, 1)$, $(2, k)$ and the straight line L_2 makes with the positive direction of the x-axis an angle of measure $45°$, then find k if the two straight lines L_1, L_2 are perpendicular.

[b] ABC is a right-angled triangle at B, if $\sqrt{2}\, AB = AC$, find the main trigonometric ratios of the angle C

5 **[a]** If $A(x, 3)$, $B(3, 2)$, $C(5, 1)$ and $AB = BC$, $B \notin \overleftrightarrow{AC}$, then find the value of x

[b] Prove that the points $A(6, 0)$, $B(2, -4)$, $C(-4, 2)$ are the vertices of a right-angled triangle at B, then find the coordinates of the point D that makes the figure ABCD a rectangle.

15 El-Fayoum Governorate

Answer the following questions : (Using calculators is allowed)

1 **Choose the correct answer :**

1. The perpendicular distance between the two straight lines $x - 2 = 0$ and $x + 3 = 0$ equals .... length units.
   (a) 1 (b) 5 (c) 2 (d) 3

2. The sum of the measures of the accumulative angles at a point is ....
   (a) 90° (b) 180° (c) 270° (d) 360°

3. If $\tan(x + 10) = \sqrt{3}$, where x is the measure of an acute angle, then $x =$ ....
   (a) 60° (b) 30° (c) 50° (d) 70°

4. The polygon in which the number of its sides is equal to the number of its diagonals is the ....
   (a) quadrilateral. (b) triangle. (c) pentagon. (d) hexagon.

5 A circle of centre at the origin point and its radius length is 2 length units. Which of the following points belongs to the circle ?

(a) $(1 , -2)$ (b) $(-2 , \sqrt{5})$ (c) $(\sqrt{3} , 1)$ (d) $(0 , 1)$

6 The square which the length of its diagonal is $8\sqrt{2}$ cm. , its area equals .... cm^2.

(a) 4 (b) 32 (c) 64 (d) 16

2 [a] Prove that the points $A (3 , -1)$, $B (-4 , 6)$, $C (2 , -2)$ which belong to an orthogonal Cartesian coordinates plane lie on the circle whose centre is $M (-1 , 2)$, and find the circumference of the circle where $\pi = 3.14$

[b] **Without using calculator , prove that :**

$\tan^2 60° - \tan^2 45° = \sin^2 60° + \cos^2 60° + 2 \sin 30°$

3 [a] Find the equation of the straight line perpendicular to $\overline{AB}$ from its midpoint where $A (1 , 3)$ and $B (3 , 5)$

[b] ABC is a right-angled triangle at B , where AC = 5 cm. , BC = 4 cm.
, find the value of : $2 \cos^2 C + \sin^2 A$

4 [a] Prove that the points $A (3 , -2)$, $B (-5 , 0)$, $C (0 , -7)$, $D (8 , -9)$ are the vertices of a parallelogram.

[b] **Find the value of X where :** $4 X = \cos^2 30° \tan^2 30° \tan^2 45°$

5 [a] If the two straight lines $3 X - 4 y - 3 = 0$ and $k y + 4 X - 8 = 0$ are both perpendicular , then find the value of k

[b] Find the equation of the straight line which intercepts from the two axes , two positive parts of length 1 and 4 from X and y axes respectively.

16 Beni Suef Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 $4 \sin 60° \tan 60° =$ ....

(a) 3 (b) 6 (c) 12 (d) $2\sqrt{3}$

2 The image of the point $(4 , 5)$ by the translation $(2 , 3)$ is ....

(a) $(6 , -8)$ (b) $(-8 , 6)$ (c) $(6 , 8)$ (d) $(-6 , -8)$

3 The perpendicular distance between the two straight lines $X - 2 = 0$, $X + 3 = 0$ equals .... length units.

(a) 1 (b) 2 (c) 4 (d) 5

4 The equation of the straight line which passes through the point $(-5 , 3)$ and is parallel to y-axis is ....

(a) $X = -5$ (b) $y = -5$ (c) $y = 3$ (d) $X = 3$

5 The number of the axes of symmetry of the circle is ....

(a) zero (b) 1 (c) 2 (d) an infinite number.

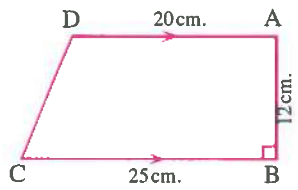
6 The points $(0 , 0)$, $(0 , 6)$ and $(8 , 0)$ ....

(a) form an acute-angled triangle. (b) form a right-angled triangle.

(c) form an obtuse-angled triangle. (d) are collinear.

2 [a] If the point $C (6 , -4)$ is the midpoint of $\overline{AB}$ where $A (5 , -3)$, find the coordinates of the point B

[b] **In the opposite figure :**



ABCD is a trapezium in which

$\overline{AD} // \overline{BC}$, $m (\angle B) = 90°$

, $AD = 20$ cm. , $AB = 12$ cm. and $BC = 25$ cm.

Find the length of $\overline{DC}$ and $m (\angle C)$

3 [a] **Prove that :** $\frac{1}{2} \sin 60° = \sin 30° \cos 30°$

[b] Find the equation of the straight line which passes through the point $(2 , 3)$ and its slope $= 2$

4 [a] If $\cos E \tan 30° = \sin^2 45°$

, find $m (\angle E)$ where E is an acute angle.

[b] Prove that the straight line which passes through the two points $(2 , -1)$ and $(6 , 3)$ is parallel to the straight line which makes a positive angle of measure 45° with the positive direction of X-axis.

5 [a] Prove that the points $A (3 , -1)$, $B (-4 , 6)$ and $C (2 , -2)$ are located on a circle whose centre is $M (-1 , 2)$

[b] Find the slope of the straight line $3y - 2X + 5 = 0$, then find the length of the intersected part from the y-axis.

17 El-Menia Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer from those given :

1 The angle whose measure is 65° complements an angle of measure ....°

(a) 35 (b) 25 (c) 115 (d) 45

2 ABCD is a parallelogram. If m (∠ A) + m (∠ C) = 200° , then m (∠ B) = ...°

(a) 50 (b) 80 (c) 100 (d) 160

3 The sum of lengths of any two sides in a triangle is .... the length of the third side.

(a) less than (b) equal to (c) greater than (d) twice

4 If sin X = $\frac{1}{2}$, then m (∠ X) = ...° , X is an acute angle.

(a) 45 (b) 60 (c) 90 (d) 30

5 The distance between the two points (3 , 0) , (0 , – 4) equals .... length units.

(a) 4 (b) 5 (c) 6 (d) 7

6 If $x + y = 5$, $k x + 2 y = 0$ are two parallel straight lines , then k = ...

(a) – 2 (b) – 1 (c) 1 (d) 2

2

[a] Without using calculator , find the value of the expression :

$\cos 60° \sin 30° - \sin 60° \tan 60° + \cos^2 30°$

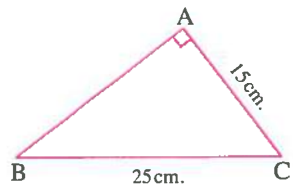
[b] Find the equation of the straight line which passes through the point (1 , 2) and is perpendicular to the straight line which passes through the two points A (2 , – 3) , B (5 , – 4)

3

[a] Without using calculator , find the value of x which satisfies :

$2 \sin x = \tan^2 60° - 2 \tan 45°$ where x is the measure of an acute angle.

[b] In Δ ABC , m (∠ A) = 90° , AC = 15 cm. , BC = 25 cm.



Prove that :

cos C cos B – sin C sin B = zero

4

[a] Prove that the points A (– 1 , – 4) , B (1 , 0) and C (2 , 2) are collinear.

[b] If C (6 , – 4) is the midpoint of $\overline{AB}$ where A (5 , – 3) , find the coordinates of the point B

5 **[a]** Prove that the straight line that makes an angle of measure 45° with the positive direction of the X-axis is parallel to the straight line whose equation is $X - y - 1 =$ zero

[b] Find the value of a if the distance between the two points (a , 7) and (– 2 , 3) equals 5 length units.

18 Assiut Governorate

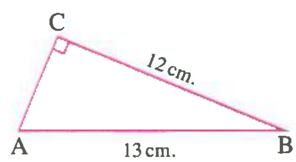
Answer the following questions : ***(Calculator is permitted)***

1 **Choose the correct answer :**

1. The measure of the straight angle is ....°
   (a) 90 (b) 360 (c) 180 (d) 240
2. If $\tan (X + 20)° = \sqrt{3}$ where $(X + 20)°$ is the measure of an acute angle , then $X =$ ....
   (a) 30 (b) 60 (c) 90 (d) 40
3. The length of the side opposite to the angle of measure 30° in the right-angled triangle equals .... the length of the hypotenuse.
   (a) $\frac{1}{4}$ (b) twice (c) $\frac{1}{2}$ (d) $\frac{1}{3}$
4. If $X + y = 5$, $k X + 2 y = 7$ are perpendicular , then k = ...
   (a) – 2 (b) – 1 (c) 1 (d) 2
5. The area of the rhombus whose diagonals lengths are 6 cm. and 12 cm. is .... cm^2.
   (a) 16 (b) 30 (c) 36 (d) 72
6. The perpendicular distance between the two straight lines $X - 3 = 0$, $X + 4 = 0$ equals .... length units.
   (a) 2 (b) 7 (c) 12 (d) 6

2 **[a] In the opposite figure :**

ABC is a right-angled triangle at C , AB = 13 cm.
, BC = 12 cm.
Prove that : sin A cos B + cos A sin B = 1



[b] Show the type of the triangle whose vertices are A (1 , 1) , B (5 , 1) , C (3 , 4) due to its side lengths.

3 **[a]** If $2 \sin X = \tan^2 60° - 4 \sin 30°$, find X , where X is the measure of an acute angle.

[b] ABCD is a parallelogram where A (3 , 2) , B (4 , – 5) , C (1 , 4) , find the two coordinates of the point at which the two diagonals intersect , then find the coordinates of the point D

4 **[a] Without using the calculator , find the value of :** $\cos 60° + \cos^2 30° + \tan^2 45°$

[b] Prove that the straight line passing through the two points $\left(2\sqrt{3} , 3\right)$, $\left(\sqrt{3} , 4\right)$ is perpendicular to the straight line that makes with the positive direction of the X-axis an angle of measure 60°

5 **[a]** Find the equation of the straight line passing through the point (3 , – 5) and parallel to the straight line $X + 3y = 7$

[b] Find the slope of the straight line and the length of the y-intercept by the straight line $\frac{y-1}{X} = \frac{1}{2}$

19 Souhag Governorate

Answer the following questions : ***(Calculator is permitted)***

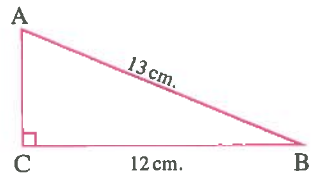
1 **Choose the correct answer :**

1. The point of concurrence of the medians of the triangle divides each median in the ratio of .... from its base.
   (a) 2 : 3 (b) 2 : 1 (c) 1 : 2 (d) 3 : 2
2. If $\sin X = \cos X$, then $X =$ ....° (X is the measure of an acute angle)
   (a) 30 (b) 45 (c) 60 (d) 90
3. The sum of the measures of the accumulative angles at a point equals ....°
   (a) 30 (b) 60 (c) 180 (d) 360
4. The distance between the two points (3 , 0) , (– 1 , 0) equals .... length units.
   (a) 4 (b) 5 (c) 6 (d) 7
5. The side length of a square is $\sqrt{3}$ cm. , then its area = ... cm^2.
   (a) $4\sqrt{3}$ (b) 9 (c) 3 (d) 6
6. If A (5 , – 3) , B (7 , – 5) , then the midpoint of $\overline{AB}$ is ....
   (a) (3 , 5) (b) (2 , 0) (c) (5 , – 5) (d) (6 , – 4)

2 **[a]** If $\cos X = 2\cos^2 30° - 1$ (X is the measure of an acute angle) **, find :** X

[b] Prove that the triangle whose vertices are A (1 , 4) , B (– 1 , – 2) , C (2 , – 3) is right-angled at B

3 **[a] In the opposite figure :**



The triangle ABC is right-angled at C

, AB = 13 cm. , BC = 12 cm.

Find : 1 The length of $\overline{AC}$

2 The value of sin A cos B + cos A sin B

[b] Find the equation of the straight line whose slope equals 2 and passes through the point (1 , 0)

4 **[a] Without using the calculator , prove that :** $2 \sin 30° = \tan^2 60° - 2 \tan 45°$

[b] Find the equation of the straight line passing through the points (1 , 3) , (– 1 , – 3) , then prove that it passes through the origin point.

5 **[a]** Prove that the points A (– 3 , – 1) , B (6 , 5) , C (3 , 3) are collinear.

[b] Prove that the straight line passing through the two points (– 3 , – 2) , (4 , 5) is parallel to the straight line which makes with the positive direction of the X-axis an angle of measure 45°

20 Qena Governorate

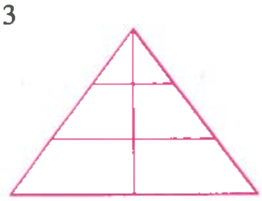
Answer the following questions :

1 **Choose the correct answer :**

1 If $\sin X = \frac{1}{2}$ where X is the measure of an acute angle , then $\sin 2X =$ ....

(a) $\frac{1}{4}$ (b) $\frac{\sqrt{3}}{2}$ (c) 60 (d) $\frac{1}{\sqrt{3}}$

2 The number of quadrilaterals in the opposite figure is ....



(a) 3 (b) 6

(c) 9 (d) 12

3 If the two straight lines $X + y = 4$, $a X + 3 y = 0$ are perpendicular , then a = ...

(a) – 3 (b) – 1 (c) 1 (d) 3

4 The number of axes of symmetry of the rhombus equals ....

(a) 1 (b) 2 (c) 3 (d) 4

5 The straight line whose equation is $2 y = 3 X - 6$ intercepted a part equal .... units from y-axis.

(a) 6 (b) 2 (c) 3 (d) $\frac{3}{2}$

6 The image of the point (– 3 , 2) by reflection on the origin point is ....

(a) (3 , 2) (b) (3 , – 2) (c) (– 3 , – 2) (d) (– 3 , 2)

2 [a] Δ ABC is a right-angled triangle at B , AC = 10 cm. , BC = 8 cm.

Prove that : $\sin^2 A + 1 = 2\cos^2 C + \cos^2 A$

[b] Prove that the points A (1 , 1) , B (0 , – 1) , C (2 , 3) are collinear.

3 [a] If $\sin X \tan 30° = \sin^2 45°$, find the value of X in degrees , where X is the measure of an acute angle.

[b] Prove that the straight line passing through (– 1 , 3) , (2 , 4) is parallel to the straight line whose equation is $3y - X - 1 = 0$

4 [a] **Without using calculator , prove that :** $\sin 60° = 2 \sin 30° \cos 30°$

[b] ABCD is a quadrilateral in which :

A (5 , 3) , B (6 , – 2) , C (1 , – 1) , D (0 , 4)

Prove that : ABCD is a rhombus and find its area.

5 [a] Prove that the points A (– 3 , 0) , B (3 , 4) , C (1 , – 6) are the vertices of an isosceles triangle its vertex A , then find the length of the perpendicular segment from A to $\overline{BC}$

[b] ABCD is a parallelogram in which A (3 , 2) , B (4 , – 5) , C (0 , – 3)

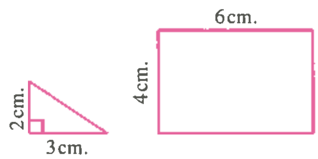
Find the coordinates of the point D

21 Luxor Governorate

Answer the following questions :

1 **Choose the correct answer :**

1 The number of the right triangles which completely cover the surface of the rectangle equals ....



(a) 10 (b) 8

(c) 6 (d) 4

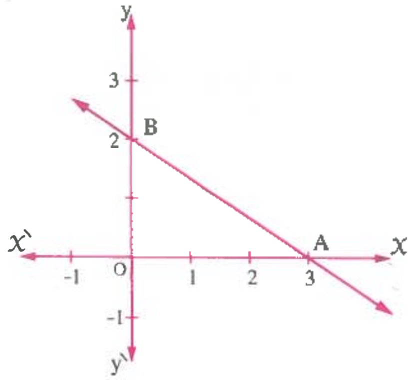
2 If m (∠ A) = 85° and sin B = cos B in Δ ABC , then m (∠ C) = ...°

(a) 30 (b) 45 (c) 50 (d) 60

3 The image of the point (– 5 , 6) by translation (3 , – 2) is ....

(a) (– 4 , – 2) (b) (4 , 2) (c) (– 2 , 4) (d) (– 2 , – 4)

4 **In the opposite figure :**



The slope of $\overleftrightarrow{AB}$ equals ……………

(a) $\frac{2}{3}$

(b) $\frac{-2}{3}$

(c) $\frac{3}{2}$

(d) $\frac{-3}{2}$

5 The measure of the exterior angle at any vertex of an equilateral triangle equals ……………°

(a) 30 (b) 60 (c) 90 (d) 120

6 If C (– 3 , y) is the midpoint of $\overline{AB}$ where A (x , – 6) and B (9 , – 12) , then y – x = ……………

(a) 7 (b) 9 (c) 6 (d) – 18

2 [a] If the distance between the two points (a , 5) , (3 a – 1 , 1) equals 5 length units , then find a

[b] If 3 tan x – 4 $\sin^2 30°$ = 8 $\cos^2 60°$, find x where x is the measure of an acute angle.

3 [a] Find the equation of the straight line passing by (1 , 2) and parallel to the straight line 2 x + 3 y – 6 = 0

[b] Find the measure of the angle made by the straight line passing by the two points $\left(-2 , \sqrt{3}\right)$, $\left(1 , 4\sqrt{3}\right)$ with the positive direction of the x-axis.

4 [a] $\overline{AB}$ is a diameter of the circle M where A (4 , – 1) , B (– 2 , 7) , find the radius length of the circle and find its area.

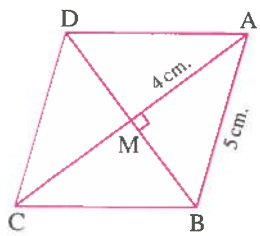
[b] ABC is a triangle where AB = AC = 10 cm. , BC = 12 cm.

, draw $\overline{AD} \perp \overline{BC}$ and intersects it at D **Prove that :**

1 $\sin^2 C + \cos^2 C = 1$ 2 sin B + cos C > 1

5 [a] If $\overleftrightarrow{AB}$ // the y-axis where A (x , 7) , B (3 , 5) , find the value of x

[b] **In the opposite figure :**



ABCD is a rhombus , its two diagonals intersect at M , if AB = 5 cm. , AM = 4 cm. , **find :**

1 m (∠ BAD)

2 The area of the rhombus ABCD

22 Aswan Governorate

Answer the following questions : ***(Calculator is allowed)***

1 Choose the correct answer from those given :

1 The angle with measure 65° is complement of an angle with measure ....

(a) 135° (b) 115° (c) 25° (d) 15°

2 If $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB} = \frac{1}{2}$, then the slope of $\overleftrightarrow{CD}$ = ...

(a) 2 (b) – 2 (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

3 If C $\in$ the axis of symmetry of $\overline{AB}$, then CA .... CB

(a) $\perp$ (b) < (c) > (d) =

4 If 3 cm. , 7 cm. and y are lengths of sides of a triangle , then y = ... cm.

(a) 3 (b) 4 (c) 7 (d) 10

5 The distance between the two points (6 , 0) and (0 , 8) equals .... length units.

(a) 6 (b) 8 (c) 10 (d) 14

6 If $\tan (X + 10) = \sqrt{3}$ where X is the measure of an acute angle , then X = ...

(a) 80° (b) 50° (c) 35° (d) 20°

2 **[a]** If $2 \sin X = \tan^2 60° - 2 \tan^2 45°$, find the value of X where X is the measure of an acute angle.

[b] Find the equation of the straight line which is perpendicular to $\overline{AB}$ from its midpoint where A (1 , 3) and B (3 , 5)

3 **[a]** If C (4 , 2) is the midpoint of $\overline{AB}$ where A (2 , 4) and B (6 , y) , find the value of y

[b] If the points A (– 1 , – 1) , B (2 , 3) , C (6 , 0) are the vertices of a triangle.

, **prove that :** Δ ABC is right-angled at B

4 **[a]** XYZ is a right-angled triangle at Y , if XY = 5 cm. , XZ = 13 cm.

, **find :** 1 tan X × tan Z 2 cos X cos Z – sin X sin Z

[b] Find the equation of the straight line which intercepts from the positive parts of the coordinates axes two parts of lengths 1 and 4 from X and y axes respectively.

5 **[a]** Prove that the straight line which passes through the two points (– 1 , 3) and (2 , 4) is parallel to the straight line whose equation is $3y - X - 1 = 0$

[b] Δ ABC is a right-angled triangle at B , if $2 AB = \sqrt{3} AC$

, find the main trigonometric ratios of the angle C

23 New Valley Governorate

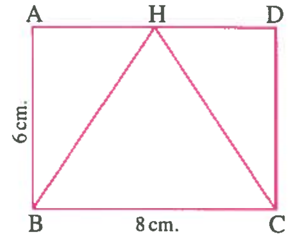
Answer the following questions : ***(Calculator is allowed)***

1 Choose the correct answer from those given :

1 The quadrilateral ABCD in which AB > CD , $\overline{AB} \parallel \overline{CD}$ is ....

(a) a square. (b) a rectangle. (c) a rhombus. (d) a trapezium.

2 **In the opposite figure :**



ABCD is a rectangle , AB = 6 cm. , BC = 8 cm.

, $H \in \overline{AD}$, the area of Δ HBC = ... cm^2.

(a) 14 (b) 24

(c) 28 (d) 48

3 For any angle A , $\frac{\sin A}{\cos A}$ = ...

(a) sin A (b) cos A (c) tan A (d) 1

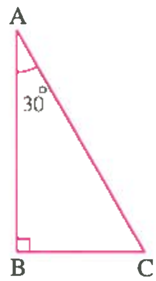
4 If ABCD is a rectangle , A (1 , 0) , C (4 , 4) , then BD = ... length units.

(a) 5 (b) 8 (c) 9 (d) 10

5 If $x + y = 5$ and $k x + 2 y = 1$ are perpendicular , then k = ...

(a) 2 (b) 1 (c) – 1 (d) – 2

6 **In the opposite figure :**



BC : AC : AB = ...

(a) $1 : \sqrt{3} : 2$

(b) $2 : \sqrt{3} : 1$

(c) $1 : 2 : \sqrt{3}$

(d) $\sqrt{3} : 1 : 2$

2 [a] XYZ is a right-angled triangle at Z , XZ = 3 cm. , YZ = 4 cm. **Find the value of :**

1 tan X tan Y 2 $\sin^2 X + \cos^2 X$

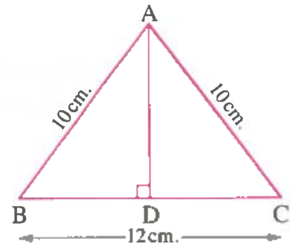
[b] Determine the type of the triangle whose vertices are A (3 , 3) , B (1 , 5) , C (1 , 3) according to its side lengths and according to its angles.

3 [a] If $\tan x = 4 \sin 30° \cos 60°$, x is the measure of an acute angle **, then find the value of each of :**

1 x 2 $\sin x$

[b] Find the equation of the straight line whose slope is 2 and passes through the point (1 , 0)

4 **[a] In the opposite figure :**



ABC is a triangle , AB = AC = 10 cm.

, BC = 12 cm. , $\overline{AD} \perp \overline{BC}$ **Find the value of :**

1 cos B 2 m (∠ B) 3 sin (90° – B)

[b] ABCD is a rhombus , A (– 2 , 3) , B (– 1 , – 2) , C (4 , – 3)

Find : 1 The coordinates of the point of intersection of its diagonals.

2 The coordinates of the point D

5 **[a]** If the straight line L_1 passes through the points (2 , 1) , (3 , k) and the straight line L_2 makes with the positive direction of the X-axis an angle of measure 45° , find the value of k , if $L_1 // L_2$

[b] Find the equation of the straight line which intersects from the two axes two positive parts of lengths 2 and 4 from X and y axes respectively.

24 South Sinai Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 If $\cos (X + 15°) = \frac{1}{2}$, then tan X = ... where X is the measure of an acute angle.

(a) 1 (b) $\sqrt{3}$ (c) $\frac{\sqrt{3}}{3}$ (d) $\frac{1}{2}$

2 The distance between the two points (– 3 , 0) and (0 , – 4) equals .... length units.

(a) 4 (b) 5 (c) 3 (d) 2

3 If A = (– 4 , 5) and B = (– 2 , – 1) , then the midpoint of $\overline{AB}$ is ....

(a) (0 , 1) (b) (– 3 , 3) (c) (– 3 , 2) (d) (1 , 0)

4 ABC is a triangle in which m (∠ A) = 120° , AB = AC , then m (∠ C) = ...

(a) 60° (b) 45° (c) 50° (d) 30°

5 If X + y = 5 and k X + 2 y = 0 are two straight lines perpendicular , then k = ...

(a) – 2 (b) 2 (c) – 1 (d) 1

6 ABC is a right-angled triangle at A and $\overline{AD} \perp \overline{BC}$, where D ∈ $\overline{BC}$, then $(AD)^2$ = ...

(a) BD × BC (b) CD × CB (c) DB × DC (d) $(DB)^2 \times (DC)^2$

2 **[a] Without using calculator , prove that :** $\cos 60° = \cos^2 30° - \sin^2 30°$

[b] If the point D = (1 , – 3) is the midpoint of $\overline{AB}$, A = (4 , – 3)

, find the coordinates of the point B

3 [a] Find the equation of the straight line which passes through the points (1 , 3) and (– 1 , – 3)

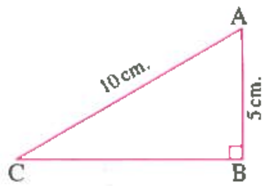
[b] Show the type of the triangle ABC whose vertices are A = (3 , 3) , B = (1 , 5) and C = (1 , 3) due to its side lengths.

4 [a] Find the equation of the straight line which passes through the point (– 2 , 3) and makes with the positive direction of the X-axis an angle of measure 45°

[b] **Find the value of :** $\frac{2 \tan 45°}{1 + \tan^2 45°}$

5 [a] Find the equation of the straight line which its slope is 2 , and intersects a positive part from y-axis that is equal to 5 units.

[b] **In the opposite figure :**



ABC is a triangle right-angled at B

, in which AC = 10 cm. , AB = 5 cm.

Find : 1 m (∠ C) 2 $\sin^2 C + \cos^2 C$

25 North Sinai Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 If $\sin X = \frac{1}{2}$ where X is the measure of an acute angle , then X = ...

(a) 90° (b) 60° (c) 45° (d) 30°

2 The measure of the exterior angle of the equilateral triangle equals ....

(a) 60° (b) 90° (c) 120° (d) 180°

3 The slope of the straight line which makes with the positive direction of X-axis a positive angle of measure 45° equals ....

(a) 1 (b) – 1 (c) zero (d) 1.4

4 The angle whose measure is 40° complements an angle of measure ....

(a) 30° (b) 140° (c) 50° (d) 40°

5 If A (2 , – 2) , B (– 2 , 2) , then the midpoint of $\overline{AB}$ is ....

(a) (– 1 , 1) (b) (1 , – 1) (c) (4 , – 4) (d) (0 , 0)

6 If 3 , 7 , ℓ are the lengths of the sides of a triangle , then ℓ can be equal to ....

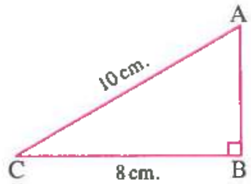
(a) 3 (b) 4 (c) 7 (d) 10

2 [a] **Prove that :** $\cos 60° = 2\cos^2 30° - 1$ (Without using the calculator)

[b] Prove that the triangle whose vertices are A (1 , – 2) , B (– 4 , 2) and C (1 , 6) is an isosceles triangle.

3 [a] Find the equation of the straight line whose slope = 2 and cuts 7 units from the positive part of y-axis.

[b] **In the opposite figure :**



ABC is a right-angled triangle at B in which AC = 10 cm.

, BC = 8 cm.

1 **Find the length of :** $\overline{AB}$

2 **Prove that :** $\sin^2 A + \cos^2 A = 1$

4 [a] If $\cos X = \dfrac{\sin 60° \sin 30°}{\sin^2 45°}$

, find the value of X where X is the measure of an acute angle. (Without using the calculator)

[b] Find the equation of the straight line passing through the point (1 , 2) and perpendicular to the straight line passing through the two points (2 , – 3) , (5 , – 4)

5 If A (3 , – 1) , B (– 4 , 6) , C (2 , – 2) and M (– 1 , 2) :

1 Prove that the points A , B , C lie on the circle whose centre is M

2 Find the circumference of the circle M (π = 3.14)

26 Red Sea Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 If A (5 , 7) , B (1 , – 1) , then the midpoint of $\overline{AB}$ is ....

(a) (2 , 3) (b) (3 , 3) (c) (3 , 2) (d) (3 , 4)

2 A rhombus whose diagonals lengths are 6 cm. , 8 cm. , then its area is .... cm^2.

(a) 48 (b) 28 (c) 24 (d) 14

3 If $\cos X = \dfrac{\sqrt{3}}{2}$ where X is the measure of an acute angle , then $\sin 2X$ = ...

(a) $\dfrac{\sqrt{3}}{2}$ (b) 1 (c) – 2 (d) $\dfrac{1}{\sqrt{3}}$

4 If the lengths of two sides of an isosceles triangle are 5 cm. and 13 cm. , then the length of the third side is .... cm.

(a) 5 (b) 8 (c) 13 (d) 16

5 If the two straight lines $3x - 4y = 3$ and $4x + ky = 8$ are perpendicular , then k = ...

(a) 4 (b) 3 (c) – 4 (d) – 3

6 The number of axes of symmetry of the equilateral triangle equals ....

(a) zero (b) 1 (c) 2 (d) 3

2 [a] **Without using calculator , prove that :** $\sin 60° = 2 \sin 30° \cos 30° \tan 45°$

[b] Find the equation of the straight line which passes through the two points (4 , 2) , (– 2 , – 1)

3 [a] Find the value of x if $\tan x = 4 \cos 60° \sin 30°$ where x is the measure of an acute angle.

[b] Prove that the points A (2 , 4) , B (– 3 , 0) and C (– 7 , 5) are the vertices of a right-angled triangle , then find its area.

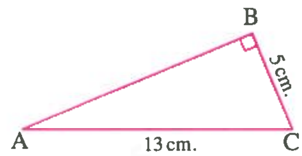
4 [a] Find the equation of the straight line which its slope is 2 and intercepts from the positive part of y-axis 7 length units.

[b] **In the opposite figure :**

ABC is a right-angled triangle at B

, AC = 13 cm. , BC = 5 cm.

Find the value of : $\sin A \cos C + \cos A \sin C$



5 [a] If the distance between the two points $(x , 7)$, (– 2 , 3) equals 5 length units , find the value of x

[b] If the straight line L_1 passes through the two points (3 , 1) , (2 , k) and the straight line L_2 makes with the positive direction of the x-axis a positive angle its measure is 45° , find the value of k if $L_1 // L_2$

27 Matrouh Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 If $\cos 2x = \frac{1}{2}$, then m $(\angle x)$ = ...

(a) 15° (b) 30° (c) 45° (d) 60°

2 The angle measured 37° is complemented by an angle of measurement ....

(a) 53° (b) 143° (c) 37° (d) 90°

3 If $\frac{-2}{3}$, $\frac{k}{2}$ are the slopes of two parallel straight lines , then k = ...

(a) $\frac{-4}{3}$ (b) $\frac{-3}{4}$ (c) 3 (d) $\frac{1}{3}$

4 The area of the circle equals ....

(a) π r (b) 2 π r (c) πr^2 (d) $2 \pi r^2$

5 In Δ ABC , AB + BC .... AC

(a) > (b) ≥ (c) < (d) ≤

6 If $\overline{AB}$ is a diameter of a circle , where A (3 , – 5) , B (5 , 1) , then the centre of the circle is ....

(a) (8 , – 2) (b) (4 , 2) (c) (2 , 2) (d) (4 , – 2)

2 **[a] Without using calculator , prove that :**

$$\tan 60° = \frac{2 \tan 30°}{1 - \tan^2 30°}$$

[b] Prove that the points A (6 , 0) , B (2 , – 4) , C (– 4 , 2) are the vertices of a right-angled triangle at B

3 **[a]** If the distance between the two points (a , 7) and (– 2 , 3) equals 5 length units , find the value of a

[b] ABC is a right-angled triangle at B , AB = 3 cm. , BC = 4 cm.

Find the value of : sin A cos C + cos A sin C

4 **[a]** If A , B are the measures of two complementary angles

, where A : B = 1 : 2

, **find :** sin A + cos B

[b] Find the slope and the intercepted part of y-axis of the straight line whose equation is $\frac{x}{2} + \frac{y}{2} = 1$

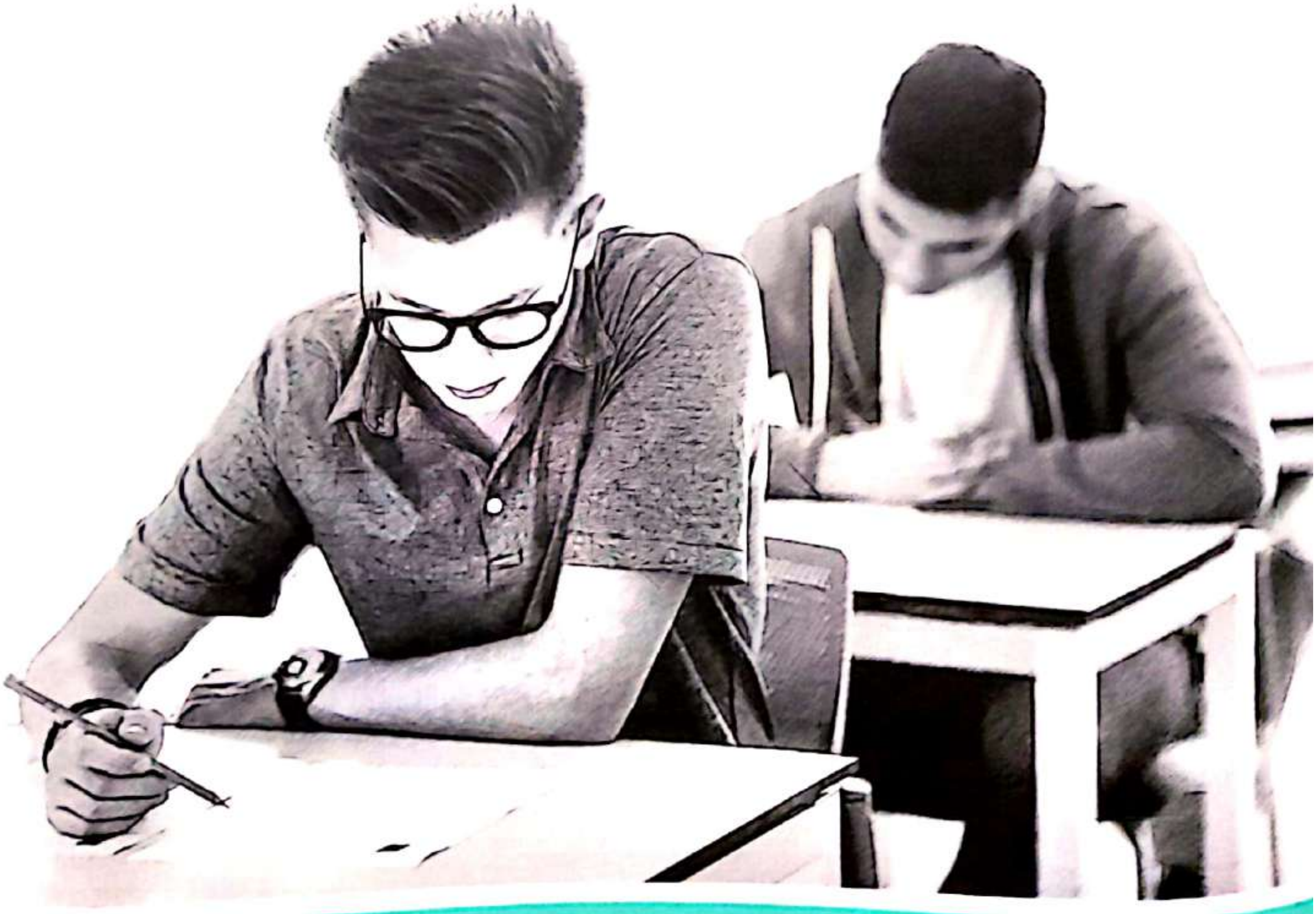
5 **[a]** If C is the midpoint of $\overline{AB}$, where A = (x , – 6) , B = (9 , – 12) and C = (– 3 , y) , find the values of x , y

[b] Find the equation of the straight line passing through the point (3 , – 5) and parallel to the straight line $x + 2y = 7$

ترخيص وزارة التربية والتعليم ٢٤٧ - ١٢ - ١٨

Final Examinations 2021

on Trigonometry and Geometry



1 Cairo Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer from those given answers :

1 If $\sin X = \frac{1}{2}$, where X is the measure of an acute angle , then $X =$ ....°

(a) 30 (b) 45 (c) 60 (d) 90

2 The straight line whose equation is $y = 3X + 4$ intercepts from the positive part of y-axis a part of length .... length units.

(a) 3 (b) 4 (c) 5 (d) 7

3 The measure of the exterior angle of an equilateral triangle equals ....°

(a) 120 (b) 90 (c) 60 (d) 30

4 If $\Delta ABC \equiv \Delta XYZ$, then AB = ...

(a) BC (b) YZ (c) XZ (d) XY

5 The equation of the straight line whose slope equals 1 and passes through the origin point is ....

(a) $y = X + 1$ (b) $X = 1$ (c) $y = 1$ (d) $y = X$

6 The angle whose measure is 30° supplements an angle of measure ....°

(a) 60 (b) 120 (c) 150 (d) 180

---

2 [a] **Without using calculator , prove that :**

$4 \sin 45° \cos 45° = 2$ (showing the steps of the solution).

[b] Find the equation of the straight line which passes through the point (1 , 2) and is parallel to the straight line whose equation is $y = 3X + 5$

---

3 [a] **Find the value of X which satisfies that :**

$X \sin 30° = \sin 30° \cos 60° + \cos 30° \sin 60°$

[b] Prove that the straight line which passes through the points (0 , 5) , (3 , 2) is perpendicular to the straight line which makes an angle of measure 45° with the positive direction of X-axis.

4 **[a]** ABCD is a parallelogram , M is the point of intersection of its diagonals where , A (3 , – 1) , C (1 , 7) Find the coordinates of the point M

[b] If A (2 , 8) , B (– 1 , 4) and C (3 , 1) are the vertices of the triangle ABC

, **prove that :** 1 The triangle ABC is a right-angled triangle at B

2 The triangle ABC is an isosceles triangle.

5 **[a]** The triangle ABC is a right-angled triangle at B where AB = 7 cm. and BC = 24 cm.

Find the value of : 1 $3 \tan A \times \tan C$ 2 $\sin^2 A + \sin^2 C$

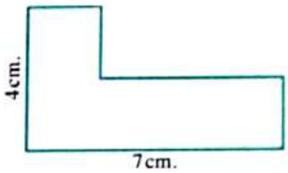
[b] If the points (0 , 1) , (a , 3) and (2 , 5) are collinear , find the value of a

2 Giza Governorate

Answer the following questions :

1 **Choose the correct answer :**

1 The perimeter of the opposite figure equals .... cm.



(a) 44 (b) 22

(c) 18 (d) 11

2 If ∠ X , ∠ Y are two complementary angles and $\sin X = \frac{3}{5}$, then cos Y = ...

(a) $\frac{4}{5}$ (b) $\frac{3}{5}$ (c) $\frac{3}{4}$ (d) $\frac{5}{3}$

3 ABCD is a parallelogram and m (∠ A) : m (∠ B) = 1 : 2 , then m (∠ B) = ...°

(a) 45 (b) 135 (c) 120 (d) 115

4 The straight line whose equation is : $y - 2X - 5 = 0$ cuts from the positive part of y-axis a part of length .... length units.

(a) 2 (b) 5 (c) 7 (d) 10

5 In Δ ABC , if the angles ∠ A , ∠ B are complementary , then m (∠ C) = ... °

(a) 45 (b) 30 (c) 90 (d) 60

6 The slope of the straight line which makes with the positive direction of X-axis an angle whose positive measure is $X°$ equals ....

(a) $\sin X$ (b) $\cos X$ (c) $\frac{\sin X}{\cos X}$ (d) $\sin X + \cos X$

2 **[a]** ABCD is a trapezoid in which $\overline{AD} // \overline{BC}$, m (∠ B) = 90° If AB = 3 cm. , AD = 6 cm. , BC = 10 cm. , **then prove that :** $\cos(\angle DCB) - \tan(\angle ACB) = \frac{1}{2}$

[b] If the straight line L_1 , passes through the points (3 , 1) , (2 , k) and the straight line L_2 makes with the positive direction of X-axis an angle of measure 45° , then find the value of k which makes the two straight lines L_1 , L_2 parallel.

1 Cairo Governorate

Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given answers :

1 If $\sin X = \frac{1}{2}$, where X is the measure of an acute angle , then $X =$ ....°

(a) 30 (b) 45 (c) 60 (d) 90

2 The straight line whose equation is $y = 3X + 4$ intercepts from the positive part of y-axis a part of length .... length units.

(a) 3 (b) 4 (c) 5 (d) 7

3 The measure of the exterior angle of an equilateral triangle equals ....°

(a) 120 (b) 90 (c) 60 (d) 30

4 If $\Delta ABC \equiv \Delta XYZ$, then AB = ...

(a) BC (b) YZ (c) XZ (d) XY

5 The equation of the straight line whose slope equals 1 and passes through the origin point is ....

(a) $y = X + 1$ (b) $X = 1$ (c) $y = 1$ (d) $y = X$

6 The angle whose measure is 30° supplements an angle of measure ....°

(a) 60 (b) 120 (c) 150 (d) 180

2 [a] Without using calculator , prove that :

$4 \sin 45° \cos 45° = 2$ (showing the steps of the solution).

[b] Find the equation of the straight line which passes through the point (1 , 2) and is parallel to the straight line whose equation is $y = 3X + 5$

3 [a] Find the value of X which satisfies that :

$X \sin 30° = \sin 30° \cos 60° + \cos 30° \sin 60°$

[b] Prove that the straight line which passes through the points (0 , 5) , (3 , 2) is perpendicular to the straight line which makes an angle of measure 45° with the positive direction of X-axis.

4 **[a]** ABCD is a parallelogram , M is the point of intersection of its diagonals where , A (3 , − 1) , C (1 , 7) Find the coordinates of the point M

[b] If A (2 , 8) , B (− 1 , 4) and C (3 , 1) are the vertices of the triangle ABC

, prove that : 1 The triangle ABC is a right-angled triangle at B

2 The triangle ABC is an isosceles triangle.

5 **[a]** The triangle ABC is a right-angled triangle at B where AB = 7 cm. and BC = 24 cm.

Find the value of : 1 $3 \tan A \times \tan C$ 2 $\sin^2 A + \sin^2 C$

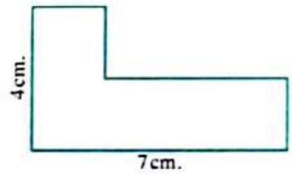
[b] If the points (0 , 1) , (a , 3) and (2 , 5) are collinear , find the value of a

2 Giza Governorate

Answer the following questions :

1 **Choose the correct answer :**

1 The perimeter of the opposite figure equals .... cm.



(a) 44 (b) 22

(c) 18 (d) 11

2 If ∠ X , ∠ Y are two complementary angles and $\sin X = \frac{3}{5}$, then cos Y = ...

(a) $\frac{4}{5}$ (b) $\frac{3}{5}$ (c) $\frac{3}{4}$ (d) $\frac{5}{3}$

3 ABCD is a parallelogram and m (∠ A) : m (∠ B) = 1 : 2 , then m (∠ B) = ...°

(a) 45 (b) 135 (c) 120 (d) 115

4 The straight line whose equation is : $y - 2X - 5 = 0$ cuts from the positive part of y-axis a part of length .... length units.

(a) 2 (b) 5 (c) 7 (d) 10

5 In Δ ABC , if the angles ∠ A , ∠ B are complementary , then m (∠ C) = ... °

(a) 45 (b) 30 (c) 90 (d) 60

6 The slope of the straight line which makes with the positive direction of X-axis an angle whose positive measure is $X°$ equals ....

(a) $\sin X$ (b) $\cos X$ (c) $\frac{\sin X}{\cos X}$ (d) $\sin X + \cos X$

2 **[a]** ABCD is a trapezoid in which $\overline{AD} \parallel \overline{BC}$, m (∠ B) = 90° If AB = 3 cm. , AD = 6 cm. , BC = 10 cm. **, then prove that :** $\cos(\angle DCB) - \tan(\angle ACB) = \frac{1}{2}$

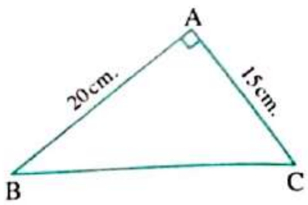
[b] If the straight line L_1 , passes through the points (3 , 1) , (2 , k) and the straight line L_2 makes with the positive direction of X-axis an angle of measure 45° , then find the value of k which makes the two straight lines L_1 , L_2 parallel.

3 **[a] In the opposite figure :**

ABC is a triangle , m (∠ A) = 90° , AC = 15 cm.

, AB = 20 cm.

Prove that : cos C cos B – sin C sin B = 0



[b] ABCD is a parallelogram its diagonals intersect at M where :

A (3 , – 1) , B (6 , 2) , C (1 , 7)

Find the coordinates of the two points M and D

4 **[a] Without using calculator , find m (∠ X) which satisfies the equation :**

tan X = 4 sin 30° cos 60° where X is a positive acute angle.

[b] Find the equation of the straight line passing through the point (3 , 4) and perpendicular to the straight line $5X - 2y + 7 = 0$

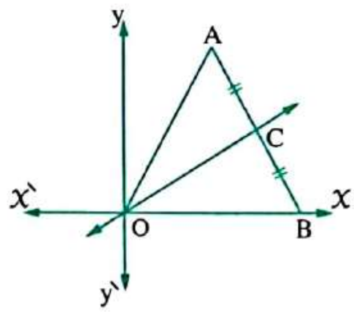
5 **[a]** If the distance between the point (a , 7) and the point (0 , 3) is equal to 5 length units. , then find the value of a

[b] In the opposite figure :

AOB is an equilateral triangle

, C is the midpoint of $\overline{AB}$

Find the equation of $\overleftrightarrow{OC}$ where O is the origin point.



3 Alexandria Governorate

Answer the following questions : ***(Calculators are permitted)***

1 **Choose the correct answer from those given :**

1 If C (6 , – 4) is the midpoint of $\overline{AB}$ where A (5 , – 3) , then B is ....

(a) (7 , – 5) (b) (– 5 , – 7) (c) (– 5 , 7) (d) (11 , – 7)

2 The measure of the angle that complements an angle of measure 60° is ....°

(a) 120 (b) zero (c) 30 (d) 90

3 If sin θ = 0.6 , then m (∠ θ) ≃ ....

(a) 51° 33' 35'' (b) 36° 52' 12'' (c) 47° 15' 48'' (d) 45° 15' 6''

4 The square whose area is 100 cm^2 , then its diagonal length is .... cm.

(a) 10 (b) 50 (c) $2\sqrt{10}$ (d) $10\sqrt{2}$

5 ABC is a right-angled triangle at B where A (1 , 4) , B (– 1 , – 2)

, then the slope of $\overleftrightarrow{BC}$ equals ....

(a) $-\frac{1}{3}$ (b) 3 (c) $\frac{1}{3}$ (d) – 3

6 The sum of the lengths of any two sides of a triangle is .... the length of the third side.

(a) smaller than (b) equal to (c) greater than (d) twice

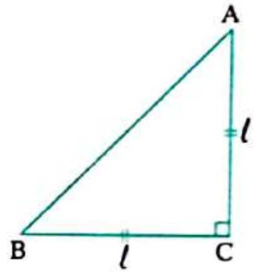
2 [a] **In the opposite figure :**

ABC is an isosceles triangle and right-angled at C

and the length of each of its legs is ℓ

Find : 1 The ratio between the lengths of the triangle sides AC : BC : AB

2 tan B , sin A



[b] If the distance between the two points (x , 5) , (6 , 1) equals $2\sqrt{5}$ length units , find the values of x

3 [a] If the points A (3 , 2) , B (4 , – 3) , C (– 1 , – 2) , D (– 2 , 3) are the vertices of a rhombus

, **find :** 1 The coordinates of the intersection point of its diagonals.

2 The area of the rhombus ABCD

[b] **Without using calculator , find the value of x (where x is the measure of an acute angle) which satisfies :** 2 sin x = sin 30° cos 60° + cos 30° sin 60°

4 [a] Find the equation of the straight line passing through the point (1 , 2) and perpendicular to the straight line passing through the two points A (2 , – 3) , B (5 , – 4)

[b] **Prove the following equality with indicating the steps :** $\tan 60° = \frac{2 \tan 30°}{1 - \tan^2 30°}$

5 [a] If the straight line L_1 passes through the two points (3 , 1) , (2 , k) and the straight line L_2 makes with the positive direction of the x-axis an angle of measure 45°

, find the value of k , if $L_1 // L_2$

[b] Prove that the points A (– 2 , 5) , B (3 , 3) , C (– 4 , 2) are not collinear.

4 El-Kalyoubia Governorate

Answer the following questions :

1 Choose the correct answer :

1 If $\cos X = \frac{\sqrt{2}}{2}$ where X is the measure of an acute angle , then $\sin 2X =$ ....

(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{-\sqrt{2}}{2}$ (c) 1 (d) $\frac{2}{\sqrt{2}}$

2 The number of the axes of symmetry of the circle equals ....

(a) zero (b) 1 (c) 2 (d) an infinite number.

3 If ABCD is a rectangle A $(-4 , -1)$, C $(4 , 5)$, then the length of $\overline{BD}$ = ... length units.

(a) 10 (b) 6 (c) 5 (d) 4

4 The perpendicular length between $X = 5$, $X + 3 = 0$ equals .... length units.

(a) 2 (b) 8 (c) -8 (d) 5

5 Δ ABC is an isosceles triangle and right-angled at C and the length of each leg is ℓ , then AB : BC : CA = ...

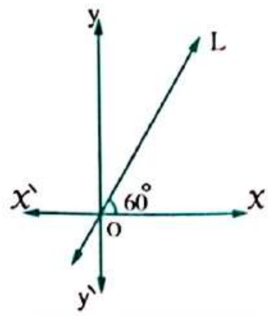
(a) $1 : 1 : \sqrt{2}$ (b) $1 : \sqrt{2} : 1$ (c) $\sqrt{2} : 1 : 2$ (d) $\sqrt{2} : 1 : 1$

6 **In the opposite figure :**

The equation of the straight line L is ....

(a) $X = \sqrt{3}\, y$ (b) $y = \sqrt{3}\, X$

(c) $X = y$ (d) $y = \sqrt{3}$



2 [a] Find the slope and the length of the y-intercept for the straight line : $\frac{X}{2} + \frac{y}{3} = 1$

[b] If $\sin X = \tan 30° \sin 60°$ where X is the measure of an acute angle , **find :** $4 \cos X \sin X$

3 [a] Find the equation of the straight line which passes through the point $(2 , -5)$ and is parallel to the straight line which passes through the two points $(-2 , 1)$, $(2 , 7)$

[b] ABC is a right-angled triangle at B , if $2\,AB = \sqrt{3}\,AC$

Find : 1 m ($\angle$ C) 2 $\sin^2 A - \cos^2 C$

4 [a] If the two straight lines $L_1 : 3\,X - 4\,y - 3 = 0$, $L_2 : a\,y + 4\,X - 8 = \text{zero}$ are perpendicular , find the value of a

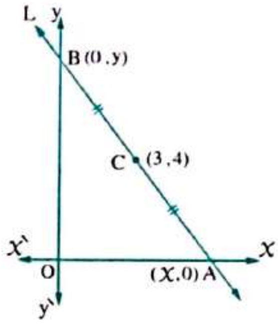
[b] If the points A (3 , 2) , B (4 , – 3) , C (– 1 , – 2) , D (– 2 , 3) are the vertices of a rhombus , find the area of the rhombus ABCD

5 [a] **Prove that :** $\cos^2 60° = \cos^2 30° \tan^2 30° \tan 45°$

[b] **In the opposite figure :**

The point C is the midpoint of $\overline{AB}$ where C (3 , 4)

Find the perimeter of the triangle AOB



5 El-Sharkia Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 In Δ ABC , if m (∠ B) = 90° , then sin A + cos C = ...

(a) 2 sin C (b) 2 cos A (c) 2 cos C (d) tan A

2 If $\sin 2\,X = \frac{1}{2}$ where $2\,X$ is the measure of an acute angle , then X = ...°

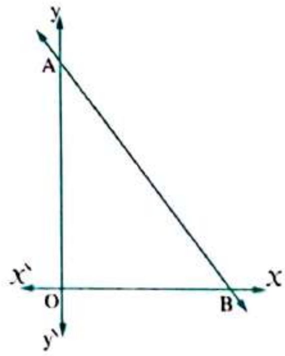
(a) 15 (b) 60 (c) 70 (d) 30

3 **In the opposite figure :**

If AO = 8 length units

, OB = 6 length units

, then the equation of $\overleftrightarrow{AB}$ is ....



(a) $y = \frac{4}{3}\,X + 8$ (b) $y = -\frac{4}{3}\,X - 8$

(c) $y = \frac{3}{4}\,X - 8$ (d) $y = -\frac{4}{3}\,X + 8$

4 The perpendicular distance between the point (3 , – 4) and X-axis equals .... length units.

(a) 3 (b) – 4 (c) 5 (d) 4

5 In the square XYZL , if the slope of $\overleftrightarrow{XZ} = 1$, then the slope of $\overleftrightarrow{YL} =$ ....

(a) 1 (b) -1 (c) ± 1 (d) $45°$

6 ABC is a right-angled triangle at B , where $3\ AC = 5\ BC$, then $\tan A =$ ....

(a) $\frac{3}{5}$ (b) $\frac{5}{3}$ (c) $\frac{3}{4}$ (d) $\frac{4}{3}$

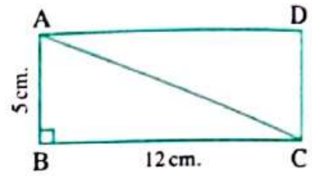
2 [a] If the point C (4 , y) is the midpoint of $\overline{AB}$ where A (x , 3) and B (6 , 5)

, find the value of : $x + y$

[b] Prove that the points A (5 , 3) , B (3 , − 2) , C (− 2 , − 4) are the vertices of a triangle

, then prove that the triangle is an obtuse-angled triangle at B

3 [a] **In the opposite figure :**



If ABCD is a rectangle in which AB = 5 cm. , BC = 12 cm.

, find : 1 The length of $\overline{AC}$

2 The value of : $5 \tan (\angle ACD) - 13 \sin (\angle DAC)$

[b] If the two points A (3 , − 1) , B (5 , 3)

, find the equation of the axis of symmetry of $\overline{AB}$

4 [a] **Without using the calculator , find the value of :** $\frac{\cos^2 60° + \cos^2 30°}{\sin 60° \tan 60°}$

[b] If the two equations of the two straight lines L_1 and L_2 are :

$L_1 : 6x + k\,y - 3 =$ zero and $L_2 : 3y = 2x + 6$ respectively.

, find the value of k which makes :

1 The two straight lines parallel. 2 The two straight lines perpendicular.

5 [a] Find the equation of the straight line which passes through the point (1 , 4) and is parallel to the straight line : $x + 2y - 4 =$ zero

[b] If ABCD is a square where : A (2 , 4) , B (− 3 , zero) , C (− 7 , 5)

, find : 1 The coordinates of the point D 2 the area of the square ABCD

6 El-Monofia Governorate

Answer the following questions : (Using calculator is permitted)

1 **Choose the correct answer :**

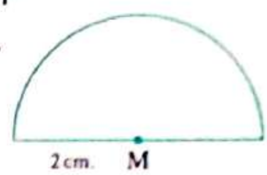
1 The surface area of a square is 25 cm^2 , then the length of its diagonal is .... cm.

(a) 5 (b) 10 (c) $5\sqrt{2}$ (d) $10\sqrt{2}$

2 ABC is a triangle. If $(AC)^2 > (AB)^2 + (BC)^2$, then $\angle$ C is ....

(a) acute. (b) obtuse. (c) right. (d) straight.

3 The opposite figure represents a semicircle with the radius length of its circle is 2 cm. , then the perimeter of this figure = ... cm.



(a) 2π (b) 4π

(c) $2\pi + 4$ (d) $4\pi + 2$

4 If $\cos\frac{X}{2} = \frac{\sqrt{3}}{2}$ where $\frac{X}{2}$ is the measure of an acute angle , then $\tan(X - 15°) =$ ....

(a) $\sqrt{3}$ (b) $\frac{1}{\sqrt{3}}$ (c) 1 (d) $\frac{\sqrt{3}}{2}$

5 The equation of a straight line is : $\frac{X}{2} - \frac{y}{3} = 6$, then it intercepts from X-axis a part of length .... length units.

(a) 3 (b) 12 (c) 6 (d) 18

6 If $\frac{-2}{3}$, $\frac{6}{k}$ are the slopes of two perpendicular straight lines , then k = ...

(a) 4 (b) -9 (c) -4 (d) 9

---

2 [a] Determine the type of the triangle ABC where : A (3 , 0) , B (1 , 4) and C (– 1 , 2) with respect to the lengths of its sides.

[b] **Without using calculator , prove that :** $\frac{\tan 45° + \tan 30°}{1 - \tan 45° \tan 30°} = 2 + \sqrt{3}$

---

3 [a] ABCD is a quadrilateral where A (2 , 4) , B (– 3 , 0) , C (– 7 , 5) and D (– 2 , 9)

Prove that : ABCD is a square.

[b] ABC is a right-angled triangle at C , AC = 6 cm. and BC = 8 cm.

Find the value of : cos A cos B – sin A sin B

---

4 [a] Prove that the straight line which passes through the two points (– 3 , – 2) and B (4 , 5) is parallel to the straight line which makes with the positive direction of X-axis an angle its measure is 45°

[b] If $\sqrt{3}\sin X \tan 30° = \tan 45° \cos 2X$, find the value of X (where X is the measure of an acute angle).

---

5 [a] Find the equation of the straight line which is perpendicular to the straight line :

$3X - 4y + 7 = 0$ and intercepts from the positive part of y-axis a part of length 4 units.

[b] ABCD is a rectangle in which AB = 3 cm. , AC = 5 cm.

Find : 1 m ($\angle$ ACB) 2 The area of the rectangle ABCD

7 El-Gharbia Governorate

Answer the following questions : ***(Calculator is allowed)***

1 Choose the correct answer :

1 The number of the axes of symmetry of the scalene triangle equals ....

(a) zero (b) 1 (c) 2 (d) 3

2 In the triangle XYZ , if $(YZ)^2 + (XZ)^2 < (XY)^2$, then $\angle Z$ is ....

(a) acute. (b) right. (c) obtuse. (d) straight.

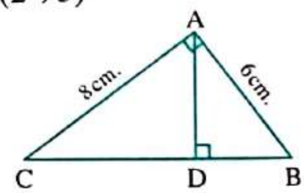
3 If the distance between the two points (a , 0) and (0 , 1) is one length unit , then a = ...

(a) 1 (b) – 1 (c) 0 (d) 2

4 If the origin point is the midpoint of $\overline{AB}$ where A (2 , – 3) , then the point B is ....

(a) (– 3 , 2) (b) (– 2 , 3) (c) (– 2 , – 3) (d) (2 , 3)

5 **In the opposite figure :** ABC is a right-angled triangle at A in which $\overrightarrow{AD} \perp \overline{BC}$ cutting it at D , AB = 6 cm. and AC = 8 cm. , then AD = ... cm.



(a) 3.6 (b) 8.4 (c) 4.8 (d) 6.4

6 ABC is a right-angled triangle at B , then sin A + 2 cos C = ...

(a) 2 sin C (b) 3 sin A (c) 2 sin A (d) 3 cos A

---

2 [a] XYZ is a right-angled triangle at Y in which : XY = 5 cm. and XZ = 13 cm.

Find the value of : cos X cos Z – sin X sin Z

[b] Find the measure of the positive angle that $\overleftrightarrow{AB}$ makes where :

A (3 , – 2) , B (6 , 1) with the negative direction of the X-axis.

---

3 [a] **Find the value of X if :** $\cos (3X + 6°) = \frac{1}{2}$ where $(3X + 6°)$ is the measure of an acute angle.

[b] Find the equation of the straight line which is parallel to the straight line $\frac{y-1}{X} = \frac{1}{3}$ and intersects from the negative part of y-axis a part equals 3 length units.

---

4 [a] **Find the value of X which satisfies :** $X - \sin 30° \cos^2 45° = \sin^2 60°$

[b] If the points A (– 3 , 0) , B (3 , 4) and C (1 , – 6) are the vertices of an isosceles triangle of vertex A , find the length of the drawn line segment from A perpendicular to $\overline{BC}$

5 [a] If the point M $(-1, 2)$ is the centre of the circle passing through the point A $(3, -1)$, find the circumference of the circle $\left(\text{where } \pi = \frac{22}{7}\right)$

[b] Find the equation of the straight line passing through the point $(1, 2)$ and perpendicular to the straight line passing through the two points A $(2, -3)$ and B $(5, -4)$

8 El-Dakahlia Governorate

Answer the following questions : ***(Calculator is permitted)***

1 **[a] Choose the correct answer :**

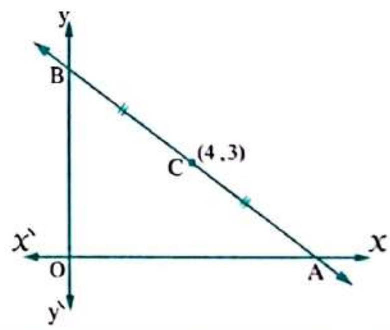
1. If m $(\angle A) = 75°$, sin A = cos B, $\angle$ B is acute, then m $(\angle B) =$ ....
   (a) 45° (b) 75° (c) 15° (d) 105°
2. If ABC is a right-angled triangle at B, AB = BC, then tan A = ...
   (a) $\frac{1}{3}$ (b) $\sqrt{3}$ (c) 1 (d) $\frac{1}{\sqrt{2}}$
3. If $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB} = 0$, then the slope of $\overleftrightarrow{CD} =$ ....
   (a) 1 (b) -1 (c) zero (d) not defined.

[b] In the opposite figure :

The point C is the midpoint of $\overline{AB}$ where C $(4, 3)$, O is the origin point in the perpendicular coordinates system.

Find : 1. The coordinates of the two points A, B

2. The area of the triangle AOB



2 **[a] Choose the correct answer :**

1. If $\cos 3X = \frac{1}{2}$, $3X$ is the measure of an acute angle, then $X =$ ....
   (a) 20° (b) 30° (c) 45° (d) 60°
2. The radius length of the circle whose centre is $(0, 0)$ and passes through $(3, 4)$ equals .... length units.
   (a) 7 (b) 1 (c) 12 (d) 5
3. The measure of the exterior angle of the equilateral triangle equals ....
   (a) 60° (b) 90° (c) 120° (d) 80°

[b] Without using calculator, find the value of X which satisfies :

$2 \sin X = \tan^2 60° - 2 \tan 45°$ where X is the measure of an acute angle.

3 [a] Find the equation of the straight line which intercepts from the positive parts of the two axes two parts of lengths 2 units , 3 units from x and y-axes respectively.

[b] ABC is a right-angled triangle at C , AC = 5 cm. , BC = 12 cm. **Find the value of :** cos A cos B – sin A sin B

4 [a] ABCD is a parallelogram where A (3 , 2) , B (4 , – 5) , C (0 , – 3)

Find the coordinates of the point at which the two diagonals intersect , then find the coordinates of the point D

[b] **Without using calculator , prove that :** $2 \sin 30° + 4 \cos 60° = \tan^2 60°$

5 [a] Prove that A (5 , 1) , B (3 , – 7) , C (1 , 3) are not collinear points.

[b] Find the equation of the straight line perpendicular to $\overline{AB}$ from its midpoint where A (2 , 1) , B (4 , 5)

9 Ismailia Governorate

Answer the following questions : (Calculator is allowed)

1 **Choose the correct answer from those given :**

1. The parallelogram whose two diagonals are equal in length and perpendicular is the ....
   (a) rectangle. (b) rhombus. (c) square. (d) trapezium.

2. If C is the midpoint of $\overline{AB}$ where A (– 3 , 6) , B (3 , – 6) , then C = ...
   (a) (6 , – 6) (b) (0 , 0) (c) (3 , 3) (d) (– 3 , 0)

3. The number of diagonals of the triangle equals ....
   (a) 3 (b) 2 (c) 1 (d) 0

4. ABC is a triangle in which m (∠ A) = 75° , sin B = cos B , then m (∠ C) = ... °
   (a) 90 (b) 60 (c) 45 (d) 30

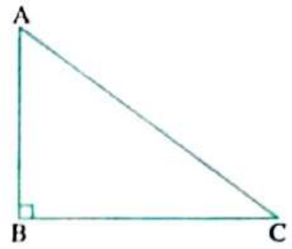
5. If the ratio between the measures of two adjacent supplementary angles is 1 : 2 , then the measure of the greater angle equals ....°
   (a) 120 (b) 90 (c) 180 (d) 60

6. The equation of the straight line which passes through the origin point and its slope = 3 is ....
   (a) $y = x$ (b) $y = 3$ (c) $x = 3$ (d) $y = 3x$

2 [a] **In the opposite figure :**

ABC is a right-angled triangle at B

Prove that : $\sin^2 A + \sin^2 C = 1$



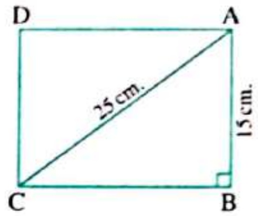
[b] Prove that the straight line which passes through the two points $(-1, 3)$, $(2, 4)$ is parallel to the straight line whose equation is $3y - x - 1 = 0$

3 [a] **In the opposite figure :**

ABCD is a rectangle, AB = 15 cm., AC = 25 cm.

Find : m ($\angle$ ACB) in degree measure

, **then find** the area of the rectangle ABCD



[b] The opposite table shows a linear relation.

Find : 1 The equation of the straight line.

2 The length of the intercepted part from y-axis.

x	1	2	3
y	1	3	5

4 [a] prove that the quadrilateral ABCD whose vertices are

A $(-1, 3)$, B $(5, 1)$, C $(7, 4)$ and D $(1, 6)$ is a parallelogram.

[b] Find the slope of the straight line which intersects from the positive parts of two coordinates x-axis and y-axis two parts of lengths 3 units, 4 units respectively, then find the equation of this straight line.

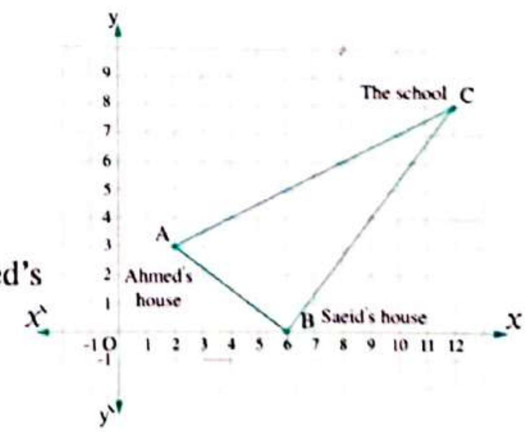
5 [a] **Without using calculator, find the value of :** $\sin 45° \cos 45° + \sin 30° \cos 60° - \cos^2 30°$

[b] **In the opposite figure :**

A represents the location of Ahmed's house

, B represents the location of Saeid's house

, C represents the location of the School.



1 Which is nearer (closer) to the school : Ahmed's house or Saeid's house ? Why ? Without measuring.

2 Are the two roads $\overline{AB}$ and $\overline{BC}$ perpendicular ? giving reason, without measuring.

10 Suez Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 If $\sin 30° = \cos \theta$ where θ is an acute angle , then $\theta =$ ....°

(a) 15 (b) 30 (c) 60 (d) 90

2 ABC is a triangle in which : $(AB)^2 > (BC)^2 + (AC)^2$, then $\angle C$ is ....

(a) acute. (b) obtuse. (c) right. (d) reflex.

3 If A $(-2 , 5)$, B $(2 , -5)$, then the midpoint of $\overline{AB}$ is ....

(a) $(0 , 0)$ (b) $(2 , 5)$ (c) $(5 , 2)$ (d) $(-5 , -2)$

4 If $\overleftrightarrow{XY}$ is the axis of symmetry of $\overline{AB}$, then XA .... XB

(a) $>$ (b) $<$ (c) $=$ (d) $\leq$

5 If m_1 , m_2 are the slopes of two perpendicular straight lines , then $m_1 \times m_2 =$ ....

(a) -1 (b) zero (c) 1 (d) 2

6 The surface area of the rhombus ABCD = ...

(a) $\frac{1}{2}$ AB × DC (b) $\frac{1}{2}$ AC × BD (c) $\frac{1}{2}$ AB × AD (d) $\frac{1}{2}$ AD × BC

---

2 [a] Find the equation of the straight line whose slope is 2 and intersects from the positive part of the y-axis a part equals 7 units.

[b] **Find the value of X if :** $4 X = \cos^2 30° \tan^2 30° \tan^2 45°$

---

3 [a] ABCD is a parallelogram whose diagonals intersect at E if A $(4 , 3)$, B $(0 , 2)$, C $(-2 , -3)$, then find the coordinates of E , D

[b] **Without using calculator , prove that :**

$\tan^2 60° - \tan^2 45° = \sin^2 60° + \cos^2 60° + 2 \sin 30°$

---

4 [a] Prove that the straight line passing through the two points $(2 , -1)$, $(6 , 3)$ is parallel to the straight line that makes with the positive direction of the X-axis an angle of measure 45°

[b] ABC is a right-angled triangle at B , if $2 AB = \sqrt{3} AC$, **find :** sin C , tan A

---

5 [a] Prove that the points A $(-3 , 0)$, B $(3 , 4)$, C $(1 , -6)$ are the vertices of an isosceles triangle of vertex A

[b] Find the equation of the straight line which passes through the point $(3 , 5)$ and is perpendicular to the straight line whose slope equals $\frac{-1}{2}$

11 Port Said Governorate

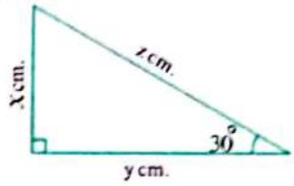
Answer the following questions :

1 Choose the correct answer from those given :

1 The product of multiplying the slopes of two perpendicular straight lines equals ....

(a) 1 (b) – 1 (c) ± 1 (d) zero

2 **In the opposite figure :**



(a) $x + y = \frac{1}{2} z$ (b) $z = x^2 + y^2$

(c) $x = \frac{1}{2} z$ (d) $2 y = z$

3 sin 30° = cos ....

(a) 10° (b) 45° (c) 30° (d) 60°

4 tan 45° = ...

(a) 1 (b) $2\sqrt{2}$ (c) $\frac{1}{2}$ (d) $\sqrt{2}$

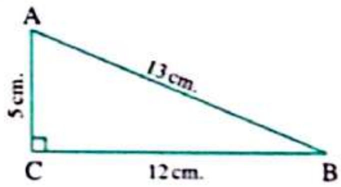
5 If A (5 , 7) , B (1 , – 1) , then the midpoint of $\overline{AB}$ is ....

(a) (2 , 3) (b) (3 , 3) (c) (3 , 2) (d) (3 , 4)

6 If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB} = \frac{2}{3}$, then the slope of $\overleftrightarrow{CD}$ = ...

(a) $\frac{3}{2}$ (b) $\frac{-3}{2}$ (c) $\frac{-2}{3}$ (d) $\frac{2}{3}$

2 [a] **In the opposite figure :**



ABC is a right-angled triangle at C

, AB = 13 cm. , BC = 12 cm. , AC = 5 cm.

1 **Prove that :** sin A cos B + cos A sin B = 1

2 **Find :** $1 + \tan^2 A$

[b] **Find the value of the following :** sin 45° cos 45° + sin 30° cos 60° – $\cos^2$ 30°

3 [a] **Find m (∠ E) , where ∠ E is an acute angle :** sin E = sin 60° cos 30° – cos 60° sin 30°

[b] Prove that the straight line passing through the two points (– 3 , – 2) , (4 , 5) is parallel to the straight line that makes with the positive direction of the x-axis an angle of measure 45°.

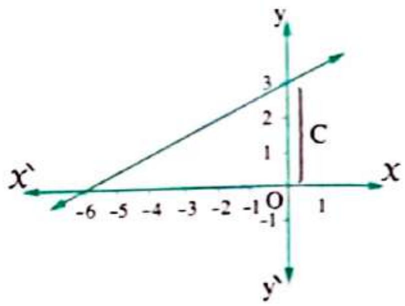
4 [a] Find the equation of the straight line passing through the point (1 , 2) and perpendicular to the straight line passing through the two points A (2 , – 3) , B (5 , – 4)

[b] Prove that the points A (3 , – 1) , B (– 4 , 6) and C (2 , – 2) are located on the circle whose centre is the point M (– 1 , 2)

5 [a] ABCD is a parallelogram where A (3 , 2) , B (4 , – 5) , C (0 , – 3) , find the coordinates of the point at which the two diagonals intersect , then find the coordinates of the point D

[b] Using the opposite figure , find the following :

1. The length of the y-intercept (c)
2. The length of the X–intercept.
3. The slope of the straight line (m)



12 Damietta Governorate

Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from the given answers :

1. If the lengths of two sides of an isosceles triangle are 2 cm. and 5 cm. , then the length of the third side is .... cm.

   (a) 2 (b) 3 (c) 5 (d) 7

2. If $\sin X = \frac{1}{2}$, X is the measure of an acute angle , then $\sin 2X =$ ....

   (a) $\frac{\sqrt{3}}{3}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{\sqrt{2}}{2}$ (d) 1

3. The surface area of the square is equal to the square of the length of the diagonal divided by ....

   (a) 1 (b) 2 (c) 3 (d) 4

4. The equation of the straight line which passes through the point (– 2 , 5) and is parallel to X-axis is ....

   (a) $X = -2$ (b) $X = 5$ (c) $y = -2$ (d) $y = 5$

5. **In the opposite figure :**

   $A \in \overleftrightarrow{AB}$, $B \in \overleftrightarrow{AB}$, m (∠ C) = 90°

   , then $X + y =$ ....

   (a) 90° (b) 180° (c) 270° (d) 360°

6. If $\overleftrightarrow{AB}$, $\overleftrightarrow{DC}$ are parallel , their slopes are m_1 , m_2 , then ....

   (a) $m_1 = -m_2$ (b) $m_1 - m_2 = 0$ (c) $m_1 m_2 = -1$ (d) $m_1 m_2 = 1$

2 [a] ABC is a right-angled triangle at C , AC = 6 cm. , BC = 8 cm.

Find : cos A cos B – sin A sin B

[b] Find the equation of the straight line which intercepts from the positive parts of the two parts of lengths 3 units and 2 units for X and y axes respectively and find its slope.

3 [a] If the distance of the point $(X , 5)$ from the point $(6 , 1)$ equals $2\sqrt{5}$ length units , then find the value of X

[b] Find the equation of the straight line which passes through the points $(2 , -1) , (1 , 1)$ and if the point $(0 , k) \in$ the straight line , find the value of k

4 [a] **Find the value of X if :** $4X = \cos^2 30° \tan^2 30° \tan^2 45°$ (Indicating the steps of the solution)

[b] If the straight line passing through the two points $(a , 0) , (0 , 3)$ is perpendicular to the straight line that makes an angle of measure 30° with the positive direction of the X-axis find a.

5 [a] **Prove that :** $\sin 45° \cos 45° + \sin 30° \cos 60° - \cos^2 30° = 0$ (Indicating the steps of the solution)

[b] Find the equation of the straight line perpendicular to $\overline{AB}$ from its midpoint C where A $(1 , 3)$ and B $(3 , 5)$

13 Kafr El-Sheikh Governorate

Answer the following questions : ***(Calculators are permitted)***

1 **Choose the correct answer from those given :**

1 In Δ ABC , if m $(\angle A) = 60°$, sin B = cos B , then m $(\angle C)$ = ...

(a) 30° (b) 75° (c) 90° (d) 105°

2 The area of the triangle bounded by the straight lines : $X = 0$, $y = 0$, $5X + 2y = 10$ is .... square units.

(a) 10 (b) 8 (c) 7 (d) 5

3 If the straight line passing through the two points $(\sqrt{3} , 1) , (2\sqrt{3} , y)$ its slope equals tan 60° , then y = ...

(a) 2 (b) 3 (c) 4 (d) 5

4 If the straight line $aX + (2 - a)y = 5$ is parallel to the straight line passing through the two points $(1 , 4) , (3 , 5)$, then a = ...

(a) 3 (b) -2 (c) 1 (d) zero

5 If the point $(\ell - 3 , 2)$ is in the first quadrant , then ℓ can be equal to ....

(a) -3 (b) 2 (c) 7 (d) zero

6 The complement of the angle whose measure is 65° is of measure ....

(a) 35° (b) 25° (c) 115° (d) 45°

2 [a] ABC is a right-angled triangle at B , AC = 13 cm. , BC = 12 cm.

Prove that : $\sin^2 C + \sin^2 A = 1$

[b] If the point A (5 , 2) lies on the circle of centre M (1 , – 1) , **then find :**

1 The surface area of the circle in terms of π

2 The equation of the straight line which passes through A and M

3 [a] If A (– 3 , 5) , B (– 1 , 7) , find the equation of the axis of symmetry of $\overline{AB}$

[b] **Without using the calculator , prove that :**

$\tan^2 60° - \tan^2 45° = \sin^2 60° + \cos^2 60° + 2 \sin 30°$

4 [a] Prove that the points A (– 1 , 3) , B (5 , 1) , C (7 , 4) , D (1 , 6) are the vertices of the parallelogram ABCD

[b] ABCD is an isosceles trapezoid in which $\overline{AD} // \overline{BC}$, AD = 4 cm. , AB = 5 cm. , BC = 12 cm. , **then calculate :** $\frac{\tan B \cos C}{\cos^2 C + \sin^2 C}$

5 [a] If the straight line L_1 passes through the two points (3 , 1) , (2 , k) and the straight line L_2 makes with the positive direction of x-axis an angle of measure 45°

, find the value of k if : 1 $L_1 // L_2$ 2 $L_1 \perp L_2$

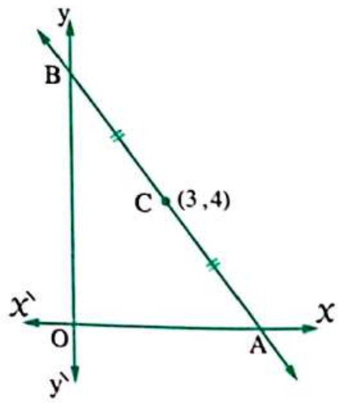
[b] **In the opposite figure :**

The point C is the midpoint of $\overline{AB}$

where C (3 , 4) , O is the origin point of the perpendicular coordinates system.

Find : 1 The coordinates of the two points A and B

2 The equation of $\overleftrightarrow{AB}$



14 El-Beheira Governorate

Answer the following questions : ***(Calculator is permitted)***

1 **Choose the correct answer from the given ones :**

1 If A (5 , 7) , B (1 , – 1) , then the midpoint of $\overline{AB}$ is ....

(a) (2 , 3) (b) (3 , 3) (c) (3 , 2) (d) (3 , 4)

2 If m (∠ B) = 80° , then m (reflex ∠ B) = ...

(a) 10° (b) 100° (c) 80° (d) 280°

3 The slope of the straight line which is parallel to the straight line passing through the two points (2 , 3) , (– 2 , 4) equals ....

(a) – 1 (b) $\frac{-1}{4}$ (c) $\frac{1}{4}$ (d) 1

4 If $\tan(x + 10°) = \sqrt{3}$ where x is the measure of an acute angle , then $x =$ ....

(a) 30° (b) 45° (c) 50° (d) 60°

5 In a parallelogram , the two diagonals are ....

(a) perpendicular. (b) equal in length.

(c) equal in length and perpendicular. (d) bisecting each other.

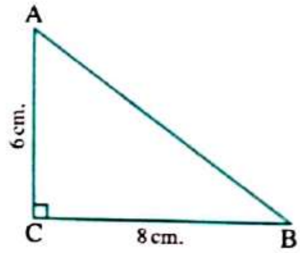
6 The triangle whose sides lengths are 2 cm. , $(x + 2)$ cm. and 5 cm. becomes an isosceles triangle when $x =$ ....

(a) zero (b) 2 (c) 3 (d) 5

2 [a] **In the opposite figure :**

ABC is a right-angled triangle

at C , AC = 6 cm. , BC = 8 cm.



Find : 1 cos A cos B – sin A sin B

2 m (∠ B)

[b] State the kind of the triangle whose vertices are the points A (– 2 , 4) , B (3 , – 1) , C (4 , 5) with respect to its sides.

3 [a] **Without using the calculator , prove that :**

$\tan^2 60° - \tan^2 45° = \cos^2 30° + \cos^2 60° + 2 \sin 30°$

[b] Find the equation of the straight line whose slope equals 2 and intersects from the negative part of the y-axis a part equals 3 units and draw it.

4 [a] **Find the value of x which satisfies :** $x \sin 30° \cos^2 45° = \sin^2 60°$

[b] If the straight line L_1 passes through the two points (3 , 1) , (2 , k) and the straight line L_2 makes with the positive direction of the x-axis an angle of measure 45° , find the value of k , if $L_1 \parallel L_2$

5 [a] If the point (3 , 1) is the midpoint of $\overline{AB}$ where A (1 , y) and B $(x , 3)$, find the point (x , y)

[b] Find the equation of the straight line passing through the point (3 , – 5) and perpendicular to the straight line : $x + 2y - 7 = 0$

15 El-Fayoum Governorate

Answer the following questions : ***(Using calculators is allowed)***

1 Choose the correct answer :

1 If $\tan 3X = \sqrt{3}$ where X is the measure of an acute angle , then $X =$ ....°

(a) 10 (b) 15 (c) 20 (d) 30

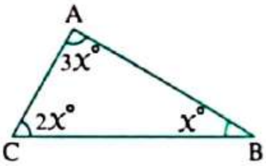
2 If the perimeter of a square is 16 cm. , then its area is .... cm^2.

(a) 4 (b) 16 (c) 60 (d) 90

3 The perpendicular distance between the two straight lines : $X - 2 = 0$, $X + 3 = 0$ equals .... length units.

(a) 1 (b) 5 (c) 2 (d) 3

4 **In the opposite figure :**



Δ ABC is .... triangle.

(a) an isosceles. (b) an equilateral.

(c) an obtuse-angled. (d) a right-angled.

5 The area of the triangle identified by the straight lines :

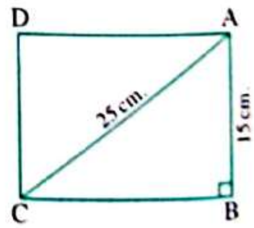
$3X - 4y = 12$, $X = 0$, $y = 0$ equals .... square units.

(a) 6 (b) 7 (c) 12 (d) 5

6 The measure of the angle of the regular hexagon is ....

(a) 108° (b) 90° (c) 120° (d) 60°

2 [a] **In the opposite figure :**



ABCD is a rectangle in which AB = 15 cm.

, AC = 25 cm.

Find : 1 m (∠ ACB)

2 The surface area of the rectangle ABCD

[b] If the distance between the two points (a , 7) , (– 2 , 3) equals 5 length units , find the values of a

3 [a] **Without using the calculator , find the value of X (where X is the measure of an acute angle) which satisfies :**

$2 \sin X = \sin 30° \cos 60° + \cos 30° \sin 60°$

[b] Prove that the straight line passing through the two points (– 1 , 3) , (2 , 4) is parallel to the straight line $3y - X - 1 = 0$

4 [a] ABCD is a quadrilateral , where A (5 , 3) , B (6 , – 2) , C (1 , – 1) , D (0 , 4).
Prove that : ABCD is a rhombus.

[b] If A (5 , – 6) , B (3 , 7) and C (1 , – 3) , find the equation of the straight line passing through the point A and the midpoint of $\overline{BC}$

5 [a] **Without using the calculator , prove that :**

$$\frac{\cos^2 60^\circ + \cos^2 30^\circ + \tan^2 45^\circ}{\sin 60^\circ \tan 60^\circ - \sin 30^\circ} = 2$$

[b] If the straight line L_1 passes through the two points A (3 , 1) , B (2 , y) and the straight line L_2 makes an angle whose measure is 45° with the positive direction of X-axis , then find the value of y if $L_1 \perp L_2$

16 Beni Suef Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 The product of multiplying the slopes of two perpendicular straight lines equals ....

(a) zero (b) 1 (c) – 1 (d) $\frac{1}{2}$

2 If $\overline{AB}$ is a diameter in a circle of centre M , where A (2 , 4) and B (– 2 , 0) , then M = ...

(a) (0 , 2) (b) (2 , 0) (c) (0 , 0) (d) (2 , 2)

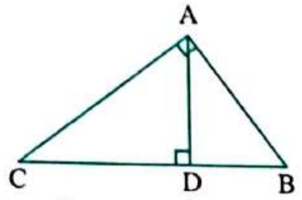
3 The quadrilateral whose diagonals are equal in length and perpendicular is the ....

(a) parallelogram. (b) rhombus. (c) rectangle. (d) square.

4 If the lengths of two sides of a triangle are 2 cm. and 5 cm. , then the length of the third side ∈ ....

(a)]2 , 5[(b)]3 , 7[(c)]2 , 7[(d)]3 , 5[

5 **In the opposite figure :**



If m (∠ BAC) = 90° , $\overline{AD} \perp \overline{BC}$, then $(AD)^2$ = ...

(a) AB × AC (b) DB × DC (c) BD × BC (d) $(AB)^2 + (BD)^2$

6 If tan (X + 15°) = 1 , where X is the measure of an acute angle , then X = ...

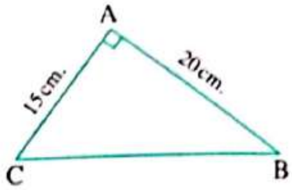
(a) 60° (b) 45° (c) 30° (d) 15°

2 [a] Find the area of the rectangle ABCD where A (– 1 , 3) , B (5 , 1) , C (6 , 4) and D (0 , 6)

[b] **Find the value of X if :** $X \cos 60° = \sin 30° + \tan 45°$

3 [a] Prove that the straight line passing through the two points (– 1 , 0) and (3 , 4) is parallel to the straight line that makes a positive angle of measure 45° with the positive direction of the X-axis.

[b] **In the opposite figure :**



ABC is a right-angled triangle at A

, AB = 20 cm. and AC = 15 cm.

Prove that : cos C cos B – sin C sin B = zero

4 [a] If C (X , – 3) is the midpoint of $\overline{AB}$ where A (– 3 , y) , B (9 , 11) **, find the value of :** $X + y$

[b] **Without using the calculator , find the value of the expression :**

$\sin 45° \cos 45° + 3 \sin 30° \cos 60° - \cos^2 30°$

5 [a] Find the equation of the straight line passing through the point (2 , – 5) and perpendicular to the straight line whose equation is y – 2 X + 7 = zero

[b] Prove that the points A (2 , 3) , B (6 , 2) , C (0 , – 1) and D (– 2 , 1) are the vertices of a trapezoid.

17 El-Menia Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer :**

1 The measure of the exterior angle of the equilateral triangle equals ....

(a) 60° (b) 90° (c) 120° (d) 180°

2 If L_1 , L_2 are two lines parallel and their slopes are $\frac{-2}{3}$, $\frac{k}{6}$, then k = ...

(a) – 12 (b) – 9 (c) 4 (d) – 4

3 The lengths of two sides of an isosceles triangle equal 2 cm. , 5 cm. , then the length of the third side equals .... cm.

(a) 5 (b) 2 (c) 3 (d) 7

4 The distance between the point (5 , 12) and the point of origin equals .... units.

(a) 5 (b) 13 (c) 12 (d) $\sqrt{17}$

5 The area of the square whose perimeter is 16 cm. equals .... cm^2

(a) 4 (b) 8 (c) 16 (d) 256

6 XYZ is an isosceles triangle right-angled at Z , then tan X = ...

(a) $\frac{1}{\sqrt{3}}$ (b) $\sqrt{3}$ (c) 1 (d) $\frac{1}{3}$

2 [a] Prove that the triangle whose vertices are A (6 , 0) , B (2 , – 4) , C (– 4 , 2) is right-angled at B

[b] XYZ is a right-angled triangle at Z where X Z = 7 cm. **Find the value of :** tan X × tan Y

3 [a] **Find X where :** $4X = \cos^2 30° \tan^2 30° \tan^2 45°$

[b] Find the equation of the straight line passing through the point (3 , – 5) and parallel to the straight line $X + 2y - 7 = 0$

4 [a] ABCD is a parallelogram , A (– 2 , 5) , B (3 , 3) , C (– 4 , 2) Find the two coordinates of the point at which the two diagonals intersect , then find the coordinates of the point D

[b] **Without using the calculator , prove that :** $\sin^2 30° = 5 \cos^2 60° - \tan^2 45°$

5 [a] If the straight line L_1 passes through the two points (3 , 1) , (2 , k) and the straight line L_2 makes with the positive direction of the X-axis an angle whose measure is 45° , then find k , if the two straight lines L_1 , L_2 are perpendicular.

[b] Find the equation of the straight line which intersects from the positive parts of X and y axes two parts of lengths 2 units , 3 units respectively.

18 Assiut Governorate

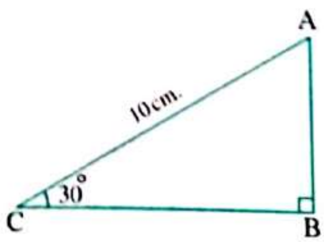
Answer the following questions : ***(Calculator is permitted)***

1 Choose the correct answer :

1 The sum of the measures of the interior angles of a triangle equals ....

(a) 90° (b) 180° (c) 360° (d) 540°

2 **In the opposite figure :**



AB = ... cm.

(a) 5 (b) 15

(c) 20 (d) 40

3 The measure of the interior angle of a regular hexagon equals ....

(a) 108° (b) 120° (c) 90° (d) 180°

4 If $2 \sin X = 1$ (where X is the measure of an acute angle) , then $X =$ ....

(a) 45° (b) 90° (c) 30° (d) 60°

5 The equation of the straight line which passes through the point (2 , – 3) and is parallel to X-axis is ....

(a) $X = 2$ (b) $y = -3$ (c) $X = -2$ (d) $y = 3$

6 If the origin point is the midpoint of $\overline{AB}$, A (5 , – 2) , then B = ...

(a) (5 , 2) (b) (– 5 , – 2) (c) (– 5 , 2) (d) (0 , 0)

---

2 [a] Prove that the points A (– 3 , – 1) , B (6 , 5) and C (3 , 3) are collinear.

[b] **Find the value of X that satisfies :** $X \sin 30° \cos^2 45° = \sin^2 60°$

---

3 [a] If the triangle whose vertices are Y (4 , 2) , X (3 , 5) and Z (– 5 , a) is right-angled at Y , then find the value of a

[b] Find the equation of the straight line whose slope is 2 and intersects from the positive part of the y-axis a part that equals 7 units.

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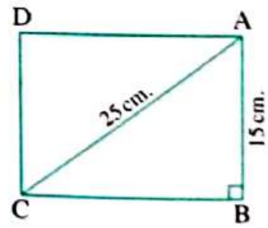
4 [a] **In the opposite figure :**

ABCD is a rectangle in which AB = 15 cm.

and AC = 25 cm.



Find : 1 m (∠ ACB)

2 The surface area of the rectangle ABCD

[b] Prove that the straight line which passes through the points (2 , 3) , (0 , 0) is parallel to the straight line which passes through (– 1 , 4) , (1 , 7)

---

5 [a] ABCD is a quadrilateral , where A (5 , 3) , B (6 , – 2) , C (1 , – 1) , and D (0 , 4)
Prove that : ABCD is a rhombus.

[b] Find the slope and the intercepted part of y-axis by the straight line :
$2X - 3y - 6 = 0$

19 Souhag Governorate

Answer the following questions : ***(Calculator is permitted)***

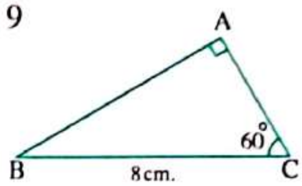
1 **Choose the correct answer :**

1. If $\sin \frac{X}{2} = \frac{1}{2}$, X is the measure of an acute angle , then $X =$ ....°
   (a) 30 (b) 60 (c) 10 (d) 90

2. The perimeter of the square whose surface area is 100 cm^2 equals .... cm.
   (a) 10 (b) 20 (c) 40 (d) 50

3. If $\frac{-2}{3}$, $\frac{6}{k}$ are the slopes of two perpendicular straight lines , then k = ...
   (a) 4 (b) − 9 (c) − 4 (d) 9

4. **In the opposite figure :**



   The length of $\overline{AC}$ = ... cm.
   (a) 2 (b) 6 (c) 4 (d) 8

5. The equation of the straight line passing through the origin point and its slope = 1 is ....
   (a) $y = X$ (b) $y = -X$ (c) $y = 2X$ (d) $y = 0$

6. If the numbers 3 , 7 , ℓ are lengths of sides of a triangle , then ℓ can be equal to ....
   (a) 3 (b) 7 (c) 4 (d) 10

2 [a] If the midpoint of $\overline{BC}$ is A (2 , 3) and C (− 1 , 3) , find the point B

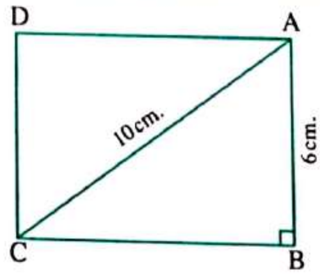
[b] If $\cos X = \sin 30° \cos 60°$ **, find :**

1. The measure of $\angle X$ (where X is an acute angle)
2. $\tan X$

3 [a] If the straight line whose equation is : $aX + 2y - 7 = 0$ is parallel to the straight line which makes an angle of measure 45° with the positive direction of X-axis , find the value of a

[b] **Without using calculator , prove that :** $\tan^2 60° - \tan^2 45° = 4 \sin 30°$

4 [a] **In the opposite figure :**



ABCD is a rectangle where AB = 6 cm. , AC = 10 cm.

Find : 1. m ($\angle$ ACB)

2. The surface area of the rectangle ABCD

[b] Find the equation of the straight line passing through the point (1 , 2) and perpendicular to the straight line $X + 3y + 7 = 0$

5 **[a]** Prove that the points A (3 , – 1) , B (– 4 , 6) , C (2 , – 2) which belong to a perpendicular coordinates plane lie on the circle whose centre is the point M (– 1 , 2) , then find the area of the circle.

[b] Find the slope and the intercepted part of y-axis by the straight line where its equation is $4X + 5y - 10 = 0$

20 Qena Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1. $\sin 30° = \dots\dots$
   (a) 1 (b) $\frac{\sqrt{3}}{2}$ (c) $\cos 60°$ (d) $\frac{1}{\sqrt{2}}$
2. The number of diagonals of the hexagon equals ……
   (a) 5 (b) 6 (c) 2 (d) 9
3. If O the origin point is the midpoint of $\overline{AB}$ as A = (– 2 , 5) , then B = ……
   (a) (2 , 5) (b) (2 , – 5) (c) (– 2 , 5) (d) (– 2 , – 5)
4. If the measure of two angles of a triangle are 70° , 40° , then the number of its axes equal ……
   (a) 1 (b) 2 (c) 3 (d) zero
5. If L_1 , L_2 are two parallel straight lines of slopes m_1 , m_2 respectively , then ……
   (a) $m_1 - m_2 = \text{zero}$ (b) $m_1 = -m_2$ (c) $m_1 \times m_2 = 1$ (d) $m_1 \times m_2 = -1$
6. If the lengths of two sides of a triangle are 2 cm. , 5 cm. , then the length of the third side can be ……
   (a) 2 cm. (b) 3 cm. (c) 4 cm. (d) 1 cm.

2 **[a]** **Without using calculator , find the value of :** $\cos 60° \sin 30° - \sin 60° \cos 30°$

[b] Find the equation of the straight line which makes with the positive direction of X-axis a positive angle of measure 135° and intercepts from the positive part of y-axis a part of length 5 length units.

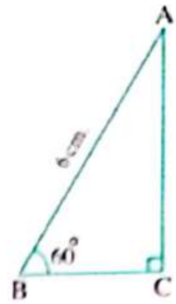
3 **[a]** Prove that the points A (1 , 4) , B (– 1 , – 2) , C (2 , – 3) are the vertices of a right-angled triangle , find its area.

[b] In the opposite figure :

ΔABC is a right-angled triangle at C

, AB = 6 cm. , m ($\angle$ B) = 60°

Find : The length of $\overline{AC}$



4 [a] Find the slope of the straight line whose equation is :

$2X - 6y = 12$, then find the points of intersection with the coordinates axes.

[b] **Without using calculator , find the value of X (where X is the measure of an acute angle) that satisfies :**

$\tan X = 4 \cos 60° \sin 30°$

5 [a] Prove that the straight line which passes through the two points (1 , 3) , (2 , 4) is parallel to the straight line whose equation is : $y - X = 5$

[b] Prove that the figure ABCD is a rectangle where A (1 , 0) , B (– 1 , 4) , C (7 , 8) , D (9 , 4)

21 Luxor Governorate

Answer the following questions :

1 **Choose the correct answer :**

1. The length of the side opposite to the angle of measure 30° in the right-angled triangle equals .... the length of the hypotenuse.

   (a) quarter. (b) twice. (c) half. (d) third.

2. If $\tan(2X - 5) = 1$ where X is the measure of an acute angle , then X = ...

   (a) 15° (b) 75° (c) 50° (d) 25°

3. If the diagonal length of a square is 10 cm. , then its area = ... cm^2.

   (a) 100 (b) 75 (c) 50 (d) 25

4. The straight line passing by the two points (0 , 0) , (2 , 3) is parallel to the straight line whose slope is ....

   (a) $\frac{3}{2}$ (b) $\frac{2}{3}$ (c) $\frac{-3}{2}$ (d) $\frac{-2}{3}$

5. The image of the point (3 , – 2) by reflection in the X-axis is ....

   (a) (– 2 , 3) (b) (3 , 2) (c) (2 , – 3) (d) (– 3 , – 2)

6. The slope of the straight line $X - 5 = 0$ is ....

   (a) 5 (b) $\frac{1}{5}$ (c) zero (d) undefined.

2 [a] **Find in degrees the value of X if :** $\tan 2X = 4 \sin 30° \cos 30°$ where $0° < X < 90°$

[b] Find the equation of the straight line passing by the point (3 , 5) and is parallel to the straight line $2X - 3y + 6 = 0$

3 [a] Prove that the straight line passing by the two points (7 , – 3) , (5 , – 1) is perpendicular to the straight line which makes an angle of measure 45° with the positive direction of X-axis.

[b] **Without using the calculator , prove that :** $2 \sin 30° + 4 \cos 60° = \tan^2 60°$

4 [a] If the distance between the points (a , 0) , (0 , 1) equals $\sqrt{2}$ length unit find a

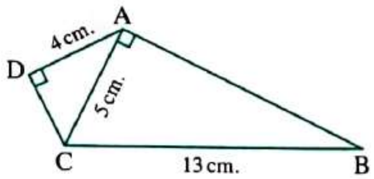
[b] If $\overline{AB}$ is a diameter in the circle M where A (4 , – 1) , B (– 2 , 7) , find the coordinates of the point M and the radius length of the circle.

5 [a] Prove that the points A (– 1 , – 4) , B (1 , 0) , C (2 , 2) are collinear.

[b] **In the opposite figure :**

m (∠ ADC) = m (∠ BAC) = 90°

, AD = 4 cm. , AC = 5 cm. , BC = 13 cm.



Find the value of :

tan (∠ DAC) sin (∠ ACB) – sin (∠ B) cos (∠ CAD)

22 Aswan Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 The measure of the exterior angle of the equilateral triangle is ....°

(a) 60 (b) 90 (c) 120 (d) 180

2 $4 \sin 30° \cos 60° =$ ....

(a) 1 (b) 2 (c) 3 (d) 4

3 The length of the opposite side of the angle with measure 30° in the right-angled triangle equals .... the length of the hypotenuse.

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

4 The equation of the straight line passing through the point $(-2, -3)$ and parallel to X-axis is ....

(a) $y = -2$ (b) $y = -3$ (c) $X = -2$ (d) $X = -3$

5 ΔABC is an isosceles triangle in which $AB = 3$ cm. , $BC = 7$ cm. , then $AC =$ .... cm.

(a) 3 (b) 4 (c) 7 (d) 10

6 The distance between the two straight lines $X - 2 = 0$, $X + 3 = 0$ equals .... length units

(a) 1 (b) 2 (c) 3 (d) 5

2 [a] Find the equation of the straight line which passes through the two points $(1, 3)$, $(-1, -3)$

[b] Prove that the points $A(3, -1)$, $B(-4, 6)$, $C(2, -2)$ lie on the circle whose centre is $M(-1, 2)$, then find the circumference of the circle.

3 [a] **Without using calculator , find the measure of $\angle E$ (Such that E is an a cute angle) If :** $2 \sin E = \sin 30° \cos 60° + \cos 30° \sin 60°$

[b] If C is the midpoint of $\overline{AB}$, then find X , y where $A(X, 3)$, $B(6, y)$, $C(4, 6)$

4 [a] ΔABC is right-angled at C in which $AC = 6$ cm. , $BC = 8$ cm.

Find : 1 $\cos A \cos B - \sin A \sin B$ 2 $m(\angle B)$

[b] If the straight line L_1 passes through the two points $(3, 1)$, $(2, k)$ and the straight line L_2 makes with the positive direction of the X-axis an angle of measure 45°

, find the value of k if the two straight lines are : 1 Parallel. 2 Perpendicular.

5 [a] Find the equation of the straight line which passes through the point $(3, -5)$ and is parallel to the straight line $X + 2y - 7 = 0$

[b] **Find the value of X if :** $X \sin 30° \cos^2 45° = \sin^2 60°$

23 New Valley Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

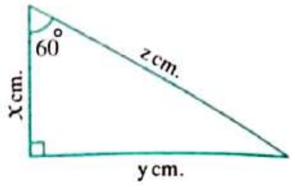
1 The area of the square whose perimeter is 16 cm. equals .... cm.^{2}

(a) 4 (b) 8 (c) 16 (d) 256

2 If the lengths of two sides of an isosceles triangle are 3 cm. , 7 cm. , then the length of the third side is .... cm.

(a) 4 (b) 7 (c) 10 (d) 3

3 **In the opposite figure :**



(a) $X + y = z$ (b) $z = X^2 + y^2$

(c) $2X = z$ (d) $y = \frac{1}{2} z$

4 $2 \sin 30° \tan 60° =$ ....

(a) $\sqrt{3}$ (b) 3 (c) $\frac{3}{2}$ (d) $\frac{1}{2}$

5 If $X + y = 5$, $k X + 2y = 0$ are perpendicular , then k = ...

(a) 1 (b) – 1 (c) 2 (d) – 2

6 If A (5 , 7) , B (1 , – 1) , then the midpoint of $\overline{AB}$ is ....

(a) (2 , 3) (b) (3 , 3) (c) (3 , 2) (d) (3 , 4)

---

2 [a] ABC is a triangle , m (∠ B) = 90° , AB = 15 cm. , BC = 20 cm.

Prove that : cos A cos C – sin A sin C = 0

[b] If the point C (3 , 1) is the midpoint of $\overline{AB}$ where A (1 , y) , B (X , 3) , find the point : (X , y)

---

3 [a] If the points (0 , 1) , (a , 3) , (2 , 5) are located on one straight line , then find the value of a

[b] Prove that the points A (3 , – 1) , B (– 4 , 6) , C (2 , – 2) which belong to an orthogonal Cartesian coordinates plane lie on the circle whose centre is M (– 1 , 2) , then find the circumference of the circle in terms of π

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4 [a] Find the equation of the straight line passing through the point (3 , 5) and parallel to the straight line $X + 3y = 7$

[b] **Find the value of X (where X is the measure of an acute angle) :**

$2 \sin X = \sin 30° \cos 60° + \cos 30° \sin 60°$

---

5 [a] Find the equation of the straight line whose slope is 2 and intersects from the negative part of y-axis a part of length 3 units.

[b] **Without using the calculator , prove that :** sin 60° = 2 sin 30° cos 30°

24 South Sinai Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 The distance between the two points (4 , 0) and (0 , – 3) equals .... length units.

(a) 5 (b) 4 (c) 3 (d) 12

2 If $\cos(X + 30^\circ) = \frac{1}{2}$ where X is the measure of an acute angle , then $X =$ ....°

(a) 60 (b) 30 (c) 45 (d) 20

3 ABC is a triangle in which AB = AC and m (∠ B) = 30° , then m (∠ A) = ...°

(a) 60 (b) 30 (c) 120 (d) 40

4 If A = (5 , 7) and B = (– 1 , – 3) , then the midpoint of $\overline{AB}$ is ....

(a) (2 , – 2) (b) (– 2 , 2) (c) (– 2 , – 2) (d) (2 , 2)

5 The number of symmetry axes of an isosceles triangle equals ....

(a) 1 (b) zero (c) 2 (d) 3

6 ABC is a right-angled triangle at B , D is the midpoint of $\overline{AC}$ and BD = 5 cm. , then AC = ... cm.

(a) 5 (b) 10 (c) 15 (d) 20

---

2 [a] ABC is a right-angled triangle at B , AC = 13 cm. , BC = 12 cm.

Prove that : $\sin^2 C + \cos^2 C = 1$

[b] Find the equation of the straight line passing through the point (2 , – 3) and parallel to the straight line $y = X + 4$

---

3 [a] **Without using calculator , prove that :** $\cos 60^\circ = 2\cos^2 30^\circ - 1$

[b] Find the equation of the straight line which passes through the point (3 , – 4) and makes with the positive direction of the X-axis an angle of measure 45°

---

4 [a] If the distance between the two points (a , 7) and (– 2 , 3) equals 5 length units , find the values of a

[b] **Find the value of X where X is the measure of an acute angle satisfying the equation :**

$\sin X = 2 \sin 30^\circ \cos 30^\circ$

---

5 [a] Find the equation of the straight line passing through the point (3 , 4) and perpendicular to the straight line whose slope = $\frac{-1}{2}$

[b] Prove that the triangle of the vertices A = (0 , 0) , B = (4 , 0) and C = (0 , 3) is right-angled , and find its surface area.

25 North Sinai Governorate

Answer the following questions :

1 Choose the correct answer from those given :

1 If a = b , a , b are the measures of two complementary angles , then a = ...°

(a) 30 (b) 45 (c) 60 (d) 90

2 If $\tan 3X = \sqrt{3}$, where X is the measure of an acute angle , then X = ...°

(a) 10 (b) 20 (c) 30 (d) 60

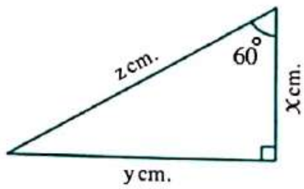
3 The sum of measures of the interior angles of the quadrilateral equals ....°

(a) 360 (b) 180 (c) 90 (d) 540

4 If A (1 , – 6) , B (9 , 2) , then the midpoint of $\overline{AB}$ is ....

(a) (– 2 , 5) (b) (2 , – 5) (c) (5 , – 2) (d) (– 5 , 2)

5 **In the opposite figure :**

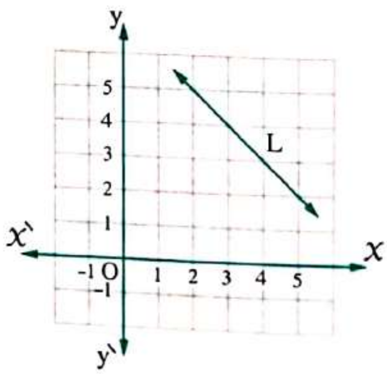


(a) $X + y = z$ (b) $z = X^2 + y^2$

(c) $2X = z$ (d) $y = \frac{1}{2} z$

6 **In the opposite figure :**

L is a straight line passing through the two points (2 , 5) , (5 , 2) , then the point .... ∈ L



(a) (1 , 6) (b) (2 , 3)

(c) (0 , 0) (d) (3 , – 4)

2 [a] Without using the calculator , prove that : $\sin 60° = 2 \sin 30° \cos 30°$

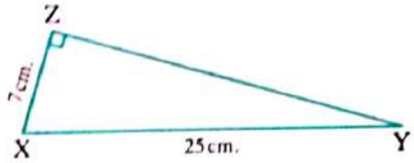
[b] ABCD is a quadrilateral , where A (2 , 4) , B (– 3 , 0) , C (– 7 , 5) , D (– 2 , 9) **prove that :** ABCD is a square.

3 [a] Find the equation of the straight line whose slope is 3 and passes through the point (5 , 0)

[b] In the opposite figure : XYZ is a right-angled triangle at Z0 , XZ = 7 cm. , XY = 25 cm.

1 **Find the value of :** $\tan X \times \tan Y$

2 **Prove that :** $\sin^2 X + \sin^2 Y = 1$



4 **[a] Without using the calculator , find the value of X if :** $2 \sin X = \tan^2 60° - 2 \tan 45°$ where X is the measure of an acute angle.

[b] Prove that the points A (– 1 , – 4) , B (1 , 0) , C (2 , 2) are collinear.

5 **[a]** Prvoe that the straight line passing through the two points (– 3 , – 2) , (4 , 5) is parallel to the straight line which makes with the positive direction of the X-axis an angle of measure 45°

[b] If the straight line passing through the two points (– 2 , 3) , (1 , k) is perpendicular to the straight line whose slope equals – 3 , then find the value of k

26 Red Sea Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 $2 \sin 30° =$ ....

(a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) 1 (d) 2

2 The measure of the exterior angle of the equilateral triangle equals ....

(a) 30° (b) 60° (c) 90° (d) 120°

3 The distance between the point (3 , 4) and the point of origin equals .... length units.

(a) 3 (b) 4 (c) 5 (d) 7

4 If 3 cm. , 7 cm. , ℓ are the lengths of the sides of a triangle , then ℓ can be equal to .... cm.

(a) 3 (b) 7 (c) 4 (d) 10

5 If $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB} = \frac{2}{3}$, then the slope of $\overleftrightarrow{CD} =$ ....

(a) $\frac{2}{3}$ (b) $-\frac{2}{3}$ (c) $\frac{3}{2}$ (d) $-\frac{3}{2}$

6 The image of the point (3 , – 2) by reflection in the origin point is ....

(a) (– 3 , 2) (b) (– 3 , – 2) (c) (3 , 2) (d) (– 2 , 3)

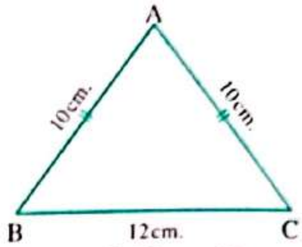
2 **[a] Find the value of :** $\cos 60° \sin 30° - \sin 60° \tan 60° + \cos^2 30°$

[b] Prove that the straight line which passes through the two points (– 3 , – 2) , (4 , 5) is parallel to the straight line which makes an angle of measure 45° with the positive direction of the X-axis.

3 [a] Find the slope of the straight line $3X + 4y - 5 = 0$, then find the length of the intercepted part from y-axis.

[b] **Find the value of X where :** $X \sin 30° \cos^2 45° = \sin^2 60°$

4 [a] **In the opposite figure :**



ABC is a triangle in which AB = AC = 10 cm.

, BC = 12 cm.

1 **Find :** m (∠ B)

2 **Prove that :** $\sin^2 B + \cos^2 B = 1$

[b] Prove that the triangle whose vertices are A (1 , 4) , B (– 1 , – 2) , C (2 , – 3) is right-angled , then find its area.

5 [a] Find the equation of the straight line which passes through the point A (4 , 6) and the midpoint of $\overline{BC}$ where B (3 , 7) , C (1 , – 3)

[b] ABCD is a parallelogram where A (3 , 3) , B (2 , – 2) , C (5 , – 1) , M is the intersection point of its diagonals. **Find :**

1 The coordinates of M

2 The coordinates of D

27 Matrouh Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from those given :**

1 The area of the square whose perimeter is 16 cm. equals .... cm^2

(a) 4 (b) 8 (c) 16 (d) 256

2 The equation of the straight line whose slope is 1 and passes through the origin point is ....

(a) $X = 1$ (b) $y = 1$ (c) $y = X$ (d) $y = -X$

3 If $\cos 2X = \frac{1}{2}$, then $X =$ ....

(a) 15° (b) 30° (c) 45° (d) 60°

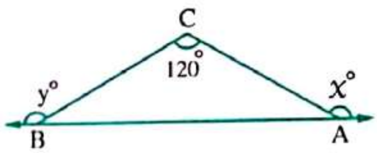
4 A right circular cylinder , if its height equals the length of its base radius = r cm. , then its volume = ... cm^3

(a) πr^3 (b) $2 \pi r^2$ (c) $2 \pi r^3$ (d) $\frac{4}{3} \pi r^3$

5 The slope of the straight line which is parallel to the X-axis is ....

(a) – 1 (b) zero (c) 1 (d) undefined.

6 **In the opposite figure :**



m (∠ C) = 120°

, then $x^\circ + y^\circ =$ ....

(a) 90° (b) 180° (c) 300° (d) 360°

---

2 **[a] Without using calculator , find the value of x if :** $4x = \cos^2 30^\circ \tan^2 30^\circ \tan^2 45^\circ$

[b] $\overline{AB}$ is a diameter of the circle M , if B (8 , 11) , M (5 , 7)

Find : 1 The coordinates of A

2 The length of the radius of the circle.

---

3 **[a]** Prove that the points A (– 2 , 5) , B (3 , 3) , C (– 4 , 2) are not collinear and if D (– 9 , 4) , prove that the figure ABCD is a parallelogram.

[b] Explaining the steps and without using calculator , find :

$$\frac{\cos^2 60^\circ + \cos^2 30^\circ - \tan^2 45^\circ}{\sin 60^\circ \tan 60^\circ - \sin 30^\circ}$$

---

4 **[a]** Find the equation of the straight line which passes through the point (3 , 4) and is perpendicular to the straight line $5x - 2y + 7 = 0$

[b] ABCD is an isosceles trapezoid , $\overline{AD} \parallel \overline{BC}$, AD = 4 cm. , AB = 5 cm. where BC = 12 cm.

Prove that : $\dfrac{5 \tan B \cos C}{\sin^2 C + \cos^2 C} = 3$

---

5 **[a]** If the straight line L_1 passes through the two points (3 , 1) , (2 , k) and the straight line L_2 makes with the positive direction of the x-axis an angle whose measure is 45°

, then find k if the two straight lines L_1 , L_2 are :

1 Parallel. 2 Perpendicular.

[b] Find the slope and the intercepted part of y-axis by the straight line : $2x = 3y + 6$

Answers of model examinations of the school book of trigonometry & geometry

Model 1

1

1 a
2 c
3 b
4 a
5 b
6 a

2

[a] $\because \sin 60^\circ = \frac{\sqrt{3}}{2}$ (1)

, $2 \sin 30^\circ \cos 30^\circ = 2 \times \frac{1}{2} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2}$ (2)

From (1) , (2) : $\therefore \sin 60^\circ = 2 \sin 30^\circ \cos 30^\circ$

[b] $\because$ The slope of $\overleftrightarrow{AB} = \frac{5+1}{6+3} = \frac{2}{3}$

, the slope of $\overleftrightarrow{BC} = \frac{3-5}{3-6} = \frac{2}{3}$

$\therefore$ The slope of $\overleftrightarrow{AB}$ = the slope of $\overleftrightarrow{BC}$

$\therefore \overleftrightarrow{AB} \parallel \overleftrightarrow{BC}$

, $\because$ B is a common point between the two straight lines.

$\therefore$ The points A , B and C are collinear.

3

[a] $\because 4 \cos 60^\circ \sin 30^\circ = 4 \times \frac{1}{2} \times \frac{1}{2} = 1$

$\therefore \tan X = 1$ $\therefore X = 45^\circ$

[b] Let B (X , y)

$\therefore (6 , -4) = \left(\frac{X+5}{2} , \frac{y-3}{2}\right)$

$\therefore \frac{X+5}{2} = 6$ $\therefore X + 5 = 12$ $\therefore X = 7$

, $\frac{y-3}{2} = -4$ $\therefore y - 3 = -8$ $\therefore y = -5$

$\therefore$ B $(7 , -5)$

4

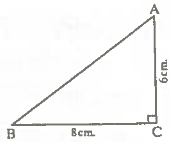
[a] $\because m_1 = \frac{k-1}{2-3} = 1 - k$

, $m_2 = \tan 45^\circ = 1$

, $\because L_1 \parallel L_2$ $\therefore m_1 = m_2$

$\therefore 1 - k = 1$ $\therefore k = 0$

[b] $\because m(\angle C) = 90^\circ$



$\therefore (AB)^2 = (6)^2 + (8)^2$

$= 100$

$\therefore AB = 10$ cm.

1 $\cos A \cos B - \sin A \sin B$

$= \frac{6}{10} \times \frac{8}{10} - \frac{8}{10} \times \frac{6}{10} = 0$

2 $\because \cos B = \frac{8}{10}$ $\therefore m(\angle B) \simeq 36^\circ 52' 12''$

5

[a] $\because$ The slope of the straight line = 2

$\therefore$ The equation of the straight line is :

$y = 2X + c$

, $\because (1 , 0)$ satisfies the equation.

$\therefore 0 = 2 \times 1 + c$ $\therefore c = -2$

$\therefore$ The equation of the straight line is : $y = 2X - 2$

[b] $\because MA = \sqrt{(-1-3)^2 + (2+1)^2} = \sqrt{16+9} = \sqrt{25}$

= 5 length units

, $MB = \sqrt{(-1+4)^2 + (2-6)^2} = \sqrt{9+16}$

$= \sqrt{25} = 5$ length units

, $MC = \sqrt{(-1-2)^2 + (2+2)^2} = \sqrt{9+16}$

$= \sqrt{25} = 5$ length units

$\therefore MA = MB = MC$

$\therefore$ A , B and C are located on the circle M

, the circumference $= 2 \pi r = 2 \times \pi \times 5$

$= 10 \pi$ length units

Model 2

1

1 a
2 d
3 b
4 c
5 b
6 b

2

[a] $\because \cos E \tan 30^\circ = \cos^2 45^\circ$

$\therefore \cos E \times \frac{1}{\sqrt{3}} = \left(\frac{1}{\sqrt{2}}\right)^2$

$\therefore \cos E = \frac{\sqrt{3}}{2}$ $\therefore m(\angle E) = 30^\circ$

[b] $\because AB = \sqrt{(3-1)^2 + (3-5)^2} = \sqrt{4+4}$

$= 2\sqrt{2}$ length units

, $BC = \sqrt{(1-1)^2 + (5-3)^2} = \sqrt{4} = 2$ length units

, $AC = \sqrt{(3-1)^2 + (3-3)^2} = \sqrt{4} = 2$ length units

$\therefore BC = AC$ $\qquad \therefore \Delta ABC$ is isosceles.

3

[a] $\because$ The slope of the straight line $= \frac{-3-3}{-1-1} = 3$

$\therefore$ The equation of the straight line is : $y = 3x + c$

, $\because (1, 3)$ satisfies the equation

$\therefore 3 = 3 \times 1 + c$ $\qquad \therefore c = 0$

$\therefore$ The equation of the straight line is : $y = 3x$

, $\because c = 0$

$\therefore$ The straight line passes through the origin point.

[b] $\because (3, 1) = \left(\frac{1+x}{2}, \frac{y+3}{2}\right)$

$\therefore \frac{1+x}{2} = 3$ $\qquad \therefore 1 + x = 6$

$\therefore x = 5$ $\qquad , \frac{y+3}{2} = 1$

$\therefore y + 3 = 2$ $\qquad \therefore y = -1$

$\therefore (x, y) = (5, -1)$

4

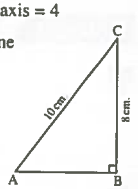
[a] $\because$ The straight line passes through the two points $(1, 0)$ and $(0, 4)$

$\therefore$ The slope $= \frac{4-0}{0-1} = -4$

$\therefore$ The equation of the straight line is :
$y = -4x + c$

, $\because$ the intercepted part from y-axis $= 4$

$\therefore$ The equation of the straight line is : $y = -4x + 4$



[b] $\because m(\angle B) = 90°$

$\therefore (AB)^2 = (10)^2 - (8)^2 = 36$

$\therefore AB = 6$ cm.

$\therefore \sin^2 A + 1 = \left(\frac{8}{10}\right)^2 + 1 = \frac{41}{25}$ (1)

, $2\cos^2 C + \cos^2 A = 2 \times \left(\frac{8}{10}\right)^2 + \left(\frac{6}{10}\right)^2 = \frac{41}{25}$ (2)

From (1) , (2) :

$\therefore \sin^2 A + 1 = 2\cos^2 C + \cos^2 A$

5

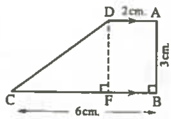
[a] $\because m_1 = \frac{4-3}{2+1} = \frac{1}{3}$

, $m_2 = \frac{1}{3}$ $\qquad \therefore m_1 = m_2$ $\qquad \therefore L_1 \parallel L_2$

[b] Draw $\overline{DF} \perp \overline{BC}$

$\because \overline{AD} \parallel \overline{BC}$, $\overline{AB} \perp \overline{BC}$

, $\overline{DF} \perp \overline{BC}$



$\therefore$ ABFD is a rectangle

$\therefore BF = AD = 2$ cm.

, $AB = DF = 3$ cm.

$\therefore FC = 6 - 2 = 4$ cm.

From Δ DFC which is right-angled at F

$\therefore (DC)^2 = (3)^2 + (4)^2 = 25$

$\therefore DC = 5$ cm.

$\therefore \cos(\angle BCD) = \frac{4}{5}$

Answers of model for the merge students

1

1 ✔	2 ✔	3 ✘
4 ✘	5 ✘	6 ✔

2

1 b	2 c	3 d
4 c	5 a	6 c

3

1 0	2 1	3 10
4 2	5 -3	6 $\frac{\sqrt{3}}{2}$

4

1 $\frac{1}{2}$	2 $\frac{3}{5}$	3 3
4 2	5 5 length units	6 $(-5, 2)$

Answers of governorates' examinations of trigonometry & geometry

1 Cairo

1

1 d   2 a   3 c   4 b   5 d   6 c

2

[a] $\because X \sin 45^\circ \cos 45^\circ = \sin 30^\circ$

$\therefore X \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} = \frac{1}{2}$ $\therefore \frac{1}{2} X = \frac{1}{2}$

$\therefore X = 1$

[b] $\because$ The slope of the straight line $= 2$

$\therefore$ Its equation is : $y = 2X + c$

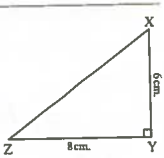
, $\because$ $(1 , 0)$ satisfies the equation.

$\therefore 0 = 2 \times 1 + c$ $\therefore c = -2$

$\therefore$ The equation is : $y = 2X - 2$

3

[a] $\because m(\angle Y) = 90^\circ$



$\therefore (XZ)^2 = (6)^2 + (8)^2 = 100$

$\therefore XZ = 10$ cm.

$\therefore \cos X \cos Z - \sin X \sin Z$

$= \frac{6}{10} \times \frac{8}{10} - \frac{8}{10} \times \frac{6}{10} = 0$

[b] $\because AB = \sqrt{(-3-2)^2 + (0-4)^2} = \sqrt{25+16}$

$= \sqrt{41}$ length units

, $BC = \sqrt{(-7+3)^2 + (5-0)^2} = \sqrt{16+25}$

$= \sqrt{41}$ length units

, $CD = \sqrt{(-2+7)^2 + (9-5)^2} = \sqrt{25+16}$

$= \sqrt{41}$ length units

, $AD = \sqrt{(-2-2)^2 + (9-4)^2} = \sqrt{16+25}$

$= \sqrt{41}$ length units

$\therefore AB = BC = CD = AD$ $\therefore$ ABCD is a rhombus

, $\because AC = \sqrt{(-7-2)^2 + (5-4)^2} = \sqrt{81+1}$

$= \sqrt{82}$ length units

, $BD = \sqrt{(-2+3)^2 + (9-0)^2} = \sqrt{1+81}$

$= \sqrt{82}$ length units

$\therefore AC = BD$ $\therefore$ ABCD is a square.

4

[a] 1 In ΔABC :

$\because m(\angle B) = 90^\circ$

$\therefore (BC)^2 = (25)^2 - (15)^2 = 400$

$\therefore BC = 20$ cm.

2 $\because \sin(\angle ACB) = \frac{15}{25}$

$\therefore m(\angle ACB) \simeq 36^\circ\ 52'\ 12''$

3 The area $= 20 \times 15 = 300$ cm^2.

[b] Let $B(X , y)$

$\therefore (6 , -4) = \left(\frac{5+X}{2} , \frac{-3+y}{2}\right)$

$\therefore \frac{5+X}{2} = 6$ $\therefore 5 + X = 12$ $\therefore X = 7$

, $\frac{-3+y}{2} = -4$ $\therefore -3 + y = -8$ $\therefore y = -5$

$\therefore B(7 , -5)$

5

[a] $\because$ The two straight lines are parallel

$\therefore m_1 = m_2$ $\therefore \frac{-a}{2} = \tan 45^\circ$

$\therefore \frac{-a}{2} = 1$ $\therefore a = -2$

[b] $\because$ The slope of the straight line $= \frac{-1-2}{-2-4} = \frac{1}{2}$

$\therefore$ Its equation is : $y = \frac{1}{2} X + c$

, $\because$ $(4 , 2)$ satisfies the equation.

$\therefore 2 = \frac{1}{2} \times 4 + c$ $\therefore c = 0$

$\therefore$ The equation is : $y = \frac{1}{2} X$

, $\because c = 0$

$\therefore$ The straight line passes through the origin point.

2 Giza

1

1 d   2 d   3 a   4 b   5 c   6 c

2

[a] $\because$ The slope $= 2$

$\therefore$ The equation is : $y = 2X + c$

, $\because$ $(1 , -1)$ satisfies the equation.

$\therefore -1 = 2 \times 1 + c$ $\therefore c = -3$

$\therefore$ The equation is : $y = 2X - 3$

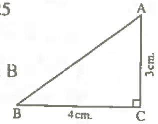
[b] 1 $\because m(\angle C) = 90°$

$\therefore (AB)^2 = (3)^2 + (4)^2 = 25$

$\therefore AB = 5$ cm.

$\therefore \cos A \cos B - \sin A \sin B$

$= \frac{3}{5} \times \frac{4}{5} - \frac{4}{5} \times \frac{3}{5} = 0$



2 $\because \tan B = \frac{3}{4}$ $\quad \therefore m(\angle B) \simeq 36° 52' 12''$

3

[a] $\because \sin 60° = \frac{\sqrt{3}}{2}$ (1)

, $2 \sin 30° \cos 30° = 2 \times \frac{1}{2} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2}$ (2)

From (1) , (2) : $\therefore \sin 60° = 2 \sin 30° \cos 30°$

[b] $\because L_1 \perp L_2$ $\quad \therefore m_1 \times m_2 = -1$

$\therefore \frac{k-1}{2-3} \times \tan 45° = -1$

$\therefore (1-k) \times 1 = -1$ $\quad \therefore k = 2$

4

[a] $\because \cos E \tan 30° = \cos^2 45°$

$\therefore \cos E \times \frac{1}{\sqrt{3}} = \left(\frac{1}{\sqrt{2}}\right)^2$

$\therefore \cos E = \frac{\sqrt{3}}{2}$ $\quad \therefore m(\angle E) = 30°$

[b] $\because AB = \sqrt{(1-3)^2 + (5-3)^2} = \sqrt{4+4}$

$= 2\sqrt{2}$ length units

, $BC = \sqrt{(1-1)^2 + (3-5)^2} = \sqrt{0+4}$

$= 2$ length units

, $AC = \sqrt{(1-3)^2 + (3-3)^2} = \sqrt{4+0}$

$= 2$ length units

$\therefore BC = AC$

$\therefore \Delta ABC$ is isosceles.

5

[a] $m = \frac{-5}{4}$

The intercepted part is $\frac{5}{2}$ from the negative part of the y-axis.

[b] $\because MA = \sqrt{(3+1)^2 + (-1-2)^2} = \sqrt{16+9}$

$= 5$ length units

, $MB = \sqrt{(-4+1)^2 + (6-2)^2} = \sqrt{9+16}$

$= 5$ length units

, $MC = \sqrt{(2+1)^2 + (-2-2)^2} = \sqrt{9+16}$

$= 5$ length units

$\therefore MA = MB = MC$

$\therefore A , B , C$ belong to the circle M

, the area $= 3.14 \times 5^2 = 78.5$ square units.

3 Alexandria

1

1 b 2 c 3 a 4 d 5 d 6 a

2

[a] $\because x \sin 30° \cos^2 45° = \sin^2 60°$

$\therefore x \times \frac{1}{2} \times \left(\frac{1}{\sqrt{2}}\right)^2 = \left(\frac{\sqrt{3}}{2}\right)^2$

$\therefore \frac{1}{4} x = \frac{3}{4}$ $\quad \therefore x = 3$

[b] $\because$ The two diagonals of the parallelogram bisect each other

Let M be the intersection point of the diagonals

$\therefore M = \left(\frac{3+0}{2} , \frac{2-3}{2}\right) = \left(\frac{3}{2} , \frac{-1}{2}\right)$

Let $D(x , y)$

$\therefore \left(\frac{3}{2} , \frac{-1}{2}\right) = \left(\frac{4+x}{2} , \frac{-5+y}{2}\right)$

$\therefore \frac{4+x}{2} = \frac{3}{2}$ $\quad \therefore 4 + x = 3$ $\quad \therefore x = -1$

, $\frac{-5+y}{2} = \frac{-1}{2}$ $\quad \therefore -5 + y = -1$ $\quad \therefore y = 4$

$\therefore D(-1 , 4)$

3

[a] $\because MA = \sqrt{(3+1)^2 + (-1-2)^2} = \sqrt{16+9}$

$= 5$ length units

, $MB = \sqrt{(-4+1)^2 + (6-2)^2} = \sqrt{9+16}$

$= 5$ length units

, $MC = \sqrt{(2+1)^2 + (-2-2)^2} = \sqrt{9+16}$

$= 5$ length units

$\therefore MA = MB = MC$

$\therefore A , B , C$ are located on the circle M

, the circumference $= 2 \times 3.14 \times 5$

$= 31.4$ length units.

[b] $\because$ The slope of the given straight line $= \frac{-1}{2}$

$\therefore$ The slope of the required straight line $= 2$

$\therefore$ Its equation is : $y = 2X + c$

, $\because$ it intercepts a part of 7 units from the positive part of the y-axis

$\therefore$ Its equation is : $y = 2X + 7$

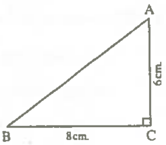
4

[a] $\because m_1 = \frac{5+2}{4+3} = 1$, $m_2 = \tan 45° = 1$

$\therefore m_1 = m_2$

$\therefore$ The two straight lines are parallel.

[b] $\because m(\angle C) = 90°$



$\therefore (AB)^2 = (6)^2 + (8)^2 = 100$

$\therefore AB = 10$ cm.

$\therefore \cos A \cos B - \sin A \sin B$

$= \frac{6}{10} \times \frac{8}{10} - \frac{8}{10} \times \frac{6}{10} = 0$

5

[a] Let D be the midpoint of $\overline{BC}$

$\therefore D = \left(\frac{3+1}{2}, \frac{7-3}{2}\right) = (2, 2)$

$\therefore$ The slope of $\overleftrightarrow{AD} = \frac{2+6}{2-4} = -4$

$\therefore$ Its equation is : $y = -4X + c$

, $\because (4, -6)$ satisfies the equation.

$\therefore -6 = -4 \times 4 + c$ $\quad\therefore c = 10$

$\therefore$ The equation is : $y = -4X + 10$

[b] 1 In ΔABC : $\because m(\angle B) = 90°$

$\therefore \sin(\angle ACB) = \frac{15}{25}$

$\therefore m(\angle ACB) \simeq 36° 52' 12''$

2 $\because (BC)^2 = (25)^2 - (15)^2 = 400$

$\therefore BC = 20$ cm.

$\therefore$ The area $= 20 \times 15 = 300$ cm^2.

4 El-Kalyoubia

1

1 d 2 b 3 c 4 a 5 c 6 c

2

[a] $\because \sqrt{(X-6)^2 + (5-1)^2} = 2\sqrt{5}$ (Squaring both sides)

$\therefore (X-6)^2 + 16 = 20$

$\therefore X^2 - 12X + 36 + 16 - 20 = 0$

$\therefore X^2 - 12X + 32 = 0$

$\therefore (X-8)(X-4) = 0$

$\therefore X = 8$ or $X = 4$

[b] $\sin 45° \cos 45° + \sin 30° \cos 60° - \cos^2 30°$

$= \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} + \frac{1}{2} \times \frac{1}{2} - \left(\frac{\sqrt{3}}{2}\right)^2$

$= \frac{1}{2} + \frac{1}{4} - \frac{3}{4} = 0$

3

[a] $\because$ The two diagonals of the parallelogram bisect each other

Let M be the intersection point of the diagonals

$\therefore M = \left(\frac{3+0}{2}, \frac{2-3}{2}\right) = \left(\frac{3}{2}, \frac{-1}{2}\right)$

Let $D(X, y)$

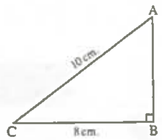
$\therefore \left(\frac{3}{2}, \frac{-1}{2}\right) = \left(\frac{4+X}{2}, \frac{-5+y}{2}\right)$

$\therefore \frac{4+X}{2} = \frac{3}{2}$ $\quad\therefore 4 + X = 3$ $\quad\therefore X = -1$

, $\frac{-5+y}{2} = \frac{-1}{2}$ $\quad\therefore -5 + y = -1$ $\quad\therefore y = 4$

$\therefore D(-1, 4)$

[b] $\because m(\angle B) = 90°$



$\therefore (AB)^2 = (10)^2 - (8)^2$

$= 36$

$\therefore AB = 6$ cm.

$\therefore \sin^2 A + 1 = \left(\frac{8}{10}\right)^2 + 1 = \frac{41}{25}$ (1)

, $2\cos^2 C + \cos^2 A = 2 \times \left(\frac{8}{10}\right)^2 + \left(\frac{6}{10}\right)^2$

$= \frac{41}{25}$ (2)

From (1) , (2) : $\therefore \sin^2 A + 1 = 2\cos^2 C + \cos^2 A$

4

[a] $\because L_1 \parallel L_2$ $\quad\therefore m_1 = m_2$

$\therefore \frac{k-1}{2-3} = \tan 45°$

$\therefore -k + 1 = 1$ $\quad\therefore k = 0$

[b] $\because$ The slope of the given straight line $= \frac{-1}{3}$

$\therefore$ The slope of the required straight line = 3

$\therefore$ Its equation is : $y = 3x + c$

, $\because$ (1 , 2) satisfies the equation.

$\therefore 2 = 3 \times 1 + c \qquad \therefore c = -1$

$\therefore$ The equation is : $y = 3x - 1$

5

[a] 1 In ΔABC : $\because m(\angle B) = 90°$

$\therefore \sin(\angle ACB) = \frac{15}{25}$

$\therefore m(\angle ACB) \simeq 36° \, 52' \, 12''$

2 $\because (BC)^2 = (25)^2 - (15)^2 = 400$

$\therefore BC = 20$ cm.

$\therefore$ The area $= 20 \times 15 = 300 \text{ cm}^2$

[b] $\because$ The straight line passes through the two points (4 , 0) , (0 , 9)

$\therefore$ The slope of the straight line $= \frac{9-0}{0-4} = -\frac{9}{4}$

and the intercepted part = 9 units from the positive part of y-axis

$\therefore$ The equation of the straight line is :

$y = -\frac{9}{4}x + 9$

5 El-Sharkia

1

1 b 2 b 3 d 4 a 5 c 6 c

2

[a] $\because \frac{\sin 30° \sin 60°}{\sin 45° \cos 45°} = \frac{\frac{1}{2} \times \frac{\sqrt{3}}{2}}{\frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}} = \frac{\sqrt{3}}{2}$ (1)

, $\cos 30° = \frac{\sqrt{3}}{2}$ (2)

From (1) , (2) : $\therefore \frac{\sin 30° \sin 60°}{\sin 45° \cos 45°} = \cos 30°$

[b] $\because MA = \sqrt{(-1-3)^2 + (2+1)^2} = \sqrt{16+9}$

= 5 length units

, $MB = \sqrt{(-1+4)^2 + (2-6)^2} = \sqrt{9+16}$

= 5 length units

and $MC = \sqrt{(-1-2)^2 + (2+2)^2} = \sqrt{9+16}$

= 5 length units

$\therefore MA = MB = MC$

$\therefore$ A , B and C lie on the circle M

, the circumference $= 2 \times 3.14 \times 5$

= 31.4 length units.

3

[a] The slope of $\overleftrightarrow{BC} = \frac{3+7}{1-3} = -5$

$\therefore$ The slope of the required straight line $= -5$

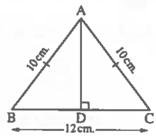
$\therefore$ Its equation is : $y = -5x + c$

, $\because$ A (5 , 1) satisfies the equation.

$\therefore 1 = -5 \times 5 + c \qquad \therefore c = 26$

$\therefore$ The equation is : $y = -5x + 26$

[b] Draw $\overline{AD} \perp \overline{BC}$



1 $\because \overline{AD} \perp \overline{BC}$, $AC = AB$

$\therefore BD = CD = 6$ cm.

In ΔADB :

$\because m(\angle ADB) = 90°$

$\therefore (AD)^2 = (10)^2 - (6)^2 = 64$

$\therefore AD = 8$ cm. $\qquad \therefore \sin B = \frac{8}{10}$

2 The area of $\Delta ABC = \frac{1}{2} \times 12 \times 8 = 48 \text{ cm}^2$

4

[a] 1 $\because$ The midpoint of $\overline{AC} = \left(\frac{3+5}{2}, \frac{3-1}{2}\right)$

= (4 , 1)

$\therefore$ The point of intersection of the two diagonals is : (4 , 1)

2 Let D (x , y)

$\therefore (4 , 1) = \left(\frac{2+x}{2}, \frac{-2+y}{2}\right)$

$\therefore \frac{2+x}{2} = 4 \qquad \therefore x = 6$

, $\frac{-2+y}{2} = 1 \qquad \therefore y = 4 \qquad \therefore D = (6 , 4)$

[b] $\because$ The slope of the straight line $= \frac{3-5}{0-4} = \frac{1}{2}$

$\therefore$ Its equation is : $y = \frac{1}{2}X + c$

, $\because$ (0 , 3) satisfies the equation.

$\therefore 3 = \frac{1}{2} \times 0 + c \qquad \therefore c = 3$

$\therefore$ The equation is : $y = \frac{1}{2}X + 3$

at $y = 0 \qquad \therefore 0 = \frac{1}{2}X + 3 \qquad \therefore X = -6$

$\therefore$ The intersection point of the straight line with the X-axis is : (– 6 , 0)

5

[a] 1 $\because \cos X = \sin 30^\circ \cos 60^\circ$

$\therefore \cos X = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

$\therefore X \simeq 75^\circ\ 31'\ 21''$

2 $\tan 75^\circ\ 31'\ 21'' \simeq 3.873$

[b] $\because$ The slope of the given straight line $= \frac{-3}{2}$

$\therefore$ The slope of the required straight line $= \frac{2}{3}$

, $\because$ the required straight line cuts 3 units of the positive part of y-axis

$\therefore$ Its equation is : $y = \frac{2}{3}X + 3$

6 El-Monofia

1

1 a 2 d 3 d 4 b 5 b 6 c

2

[a] $\sin 30^\circ \cos 60^\circ + \cos 30^\circ \sin 60^\circ - \tan^2 45^\circ$

$= \frac{1}{2} \times \frac{1}{2} + \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} - (1)^2$

$= \frac{1}{4} + \frac{3}{4} - 1 = 0$

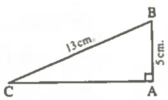
[b] 1 $\because AB = \sqrt{(5-7)^2 + (1+3)^2} = \sqrt{4+16}$

$= 2\sqrt{5}$ length units

$\therefore$ The area $= 3.14 \times \left(\sqrt{5}\right)^2 = 15.7 \text{ cm}^2$

2 $M = \left(\frac{7+5}{2}, \frac{-3+1}{2}\right) = (6, -1)$

3



[a] $\because m(\angle A) = 90^\circ$

$\therefore (AC)^2 = (13)^2 - (5)^2$

$= 144$

$\therefore AC = 12$ cm.

$\therefore \sin C \cos B + \cos C \sin B$

$= \frac{5}{13} \times \frac{5}{13} + \frac{12}{13} \times \frac{12}{13} = 1$

[b] $\because$ The slope of the given straight line $= \frac{1-0}{2-5} = \frac{-1}{3}$

$\therefore$ The slope of the required straight line = 3

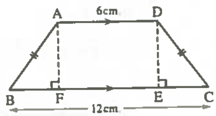
$\therefore$ Its equation is : $y = 3X + c$

, $\because$ (1 , 3) satisfies the equation.

$\therefore 3 = 3 \times 1 + c \qquad \therefore c = 0$

$\therefore$ The equation is : $y = 3X$

4



[a] Draw $\overline{AF} \perp \overline{BC}$

, $\overline{DE} \perp \overline{BC}$

$\because \overline{AD} \parallel \overline{BC}$

, $\overline{AF} \perp \overline{BC}$

, $\overline{DE} \perp \overline{BC}$

$\therefore$ ADEF is a rectangle $\qquad \therefore$ EF = AD = 6 cm.

$\therefore$ BF + EC = 6 cm.

$\therefore$ BF = EC = 3 cm. ($\Delta ABF \equiv \Delta DCE$)

$\because$ The area of the trapezium $= \frac{1}{2}(AD + BC) \times AF$

$\therefore 36 = \frac{1}{2}(6 + 12) \times AF$

$\therefore$ AF = 4 cm. $\qquad \therefore$ DE = AF = 4 cm.

In ΔABF : $\because m(\angle AFB) = 90^\circ$

$\therefore (AB)^2 = (3)^2 + (4)^2 = 25 \qquad \therefore$ AB = 5 cm.

$\therefore$ DC = AB = 5 cm.

$\therefore \sin B + \cos C = \frac{4}{5} + \frac{3}{5} = \frac{7}{5}$

[b] $\because AB = \sqrt{(5+1)^2 + (1-3)^2} = \sqrt{36+4}$

$= \sqrt{40}$ length units

, $BC = \sqrt{(6-5)^2 + (4-1)^2} = \sqrt{1+9}$

$= \sqrt{10}$ length units

, $AC = \sqrt{(6+1)^2 + (4-3)^2} = \sqrt{49+1}$

$= \sqrt{50}$ length units

$\therefore (AC)^2 = 50$

, $(AB)^2 + (BC)^2 = 40 + 10 = 50$

$\therefore (AC)^2 = (AB)^2 + (BC)^2$

$\therefore \Delta ABC$ is a right-angled triangle at B

5

[a] The slope $= \frac{-4}{5}$ and the intercepted part $= 2$ units from the positive part of the y-axis.

[b] [1] $\because$ The slope of $\overleftrightarrow{CD} = \frac{6-2}{-3-3} = \frac{-2}{3}$

$\therefore$ The equation of $\overleftrightarrow{CD}$ is : $y = \frac{-2}{3}x + c$

, $\because$ A (3 , 2) satisfies the equation.

$\therefore 2 = \frac{-2}{3} \times 3 + c$ $\qquad \therefore c = 4$

$\therefore$ The equation is : $y = \frac{-2}{3}x + 4$

[2] At $x = 0$ $\qquad \therefore y = \frac{-2}{3} \times 0 + 4$ $\qquad \therefore y = 4$

$\therefore$ OD = 4 units

, at $y = 0$ $\qquad \therefore 0 = \frac{-2}{3}x + 4$ $\qquad \therefore x = 6$

$\therefore$ OC = 6 units

$\therefore$ The area of Δ DOC $= \frac{1}{2} \times 4 \times 6$

$= 12$ square units.

7 El-Gharbia

1

[1] c [2] c [3] b [4] b [5] a [6] d

2

[a] $\because \tan x = 4 \cos 60^\circ \sin 30^\circ$

$\therefore \tan x = 4 \times \frac{1}{2} \times \frac{1}{2} = 1$ $\qquad \therefore x = 45^\circ$

[b] [1] $\because \overleftrightarrow{XY} \perp \overleftrightarrow{YZ}$

$\therefore$ The slope of $\overleftrightarrow{XY}$ $\times$ the slope of $\overleftrightarrow{YZ} = -1$

$\therefore \frac{2-5}{4-3} \times \frac{a-2}{-5-4} = -1$

$\therefore -3 \times \frac{a-2}{-9} = -1$ $\qquad \therefore a - 2 = -3$

$\therefore a = -1$

[2] $\because XY = \sqrt{(4-3)^2 + (2-5)^2} = \sqrt{1+9}$

$= \sqrt{10}$ length units

, $YZ = \sqrt{(-5-4)^2 + (-1-2)^2} = \sqrt{81+9}$

$= \sqrt{90}$ length units

$\therefore$ The area of Δ XYZ $= \frac{1}{2} \times \sqrt{10} \times \sqrt{90}$

$= 15$ square units.

3

[a] Let the measures be $3x$, $5x$

$\therefore 3x + 5x = 180^\circ$ $\qquad \therefore 8x = 180^\circ$

$\therefore x = 22^\circ 30'$

$\therefore$ The measures are : $67^\circ 30'$, $112^\circ 30^\circ$

[b] $\because$ The slope of the given straight line $= -1$

$\therefore$ The slope of the required straight line $= 1$

$\therefore$ Its equation is : $y = x + c$

, $\because (-1 , 2)$ satisfies the equation.

$\therefore 2 = -1 + c$ $\qquad \therefore c = 3$

$\therefore$ The equation is : $y = x + 3$

4

[a] $\because MA = \sqrt{(-1-3)^2 + (2+1)^2} = \sqrt{16+9}$

$= 5$ length units

, $MB = \sqrt{(-1+4)^2 + (2-6)^2} = \sqrt{9+16}$

$= 5$ length units

and $MC = \sqrt{(-1-2)^2 + (2+2)^2} = \sqrt{9+16}$

$= 5$ length units

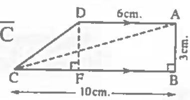
$\therefore$ MA = MB = MC

$\therefore$ A , B and C lie on the circle M

, the circumference $= 2 \times 5 \times \pi$

$= 10\pi$ length units.

[b] Draw $\overline{DF} \perp \overline{BC}$



$\because \overline{AD} \,/\!/\, \overline{BC}$, $\overline{AB} \perp \overline{BC}$

, $\overline{DF} \perp \overline{BC}$

$\therefore$ ABFD is a rectangle

$\therefore$ BF = AD = 6 cm.

$\therefore$ FC = 4 cm. , DF = AB = 3 cm.

$\therefore$ From Δ DFC which is right-angled at F

$(DC)^2 = 3^2 + 4^2 = 25$ $\qquad \therefore$ DC = 5 cm.

$\therefore \cos(\angle DCB) - \tan(\angle ACB) = \frac{4}{5} - \frac{3}{10} = \frac{1}{2}$

5

[a] [1] $\because$ The midpoint of $\overline{AC} = \left(\frac{3+0}{2} , \frac{2-3}{2}\right)$

$= \left(1\frac{1}{2} , -\frac{1}{2}\right)$

$\therefore$ The intersection point of the two diagonals is $\left(1\frac{1}{2} , -\frac{1}{2}\right)$

[2] Let D (x , y)

$\because$ The midpoint of $\overline{AC}$ = the midpoint of $\overline{BD}$

$\therefore \left(1\frac{1}{2} , -\frac{1}{2}\right) = \left(\frac{x+4}{2} , \frac{y-5}{2}\right)$

$\therefore \frac{x+4}{2} = 1\frac{1}{2}$

$\therefore x + 4 = 3 \qquad \therefore x = -1$

$, \frac{y-5}{2} = -\frac{1}{2} \qquad \therefore y - 5 = -1 \qquad \therefore y = 4$

$\therefore D(-1 , 4)$

[b] $\boxed{1}$ Let $A(x , 0)$, $B(0 , y)$

$\therefore (3 , 4) = \left(\frac{x+0}{2} , \frac{0+y}{2}\right)$

$\therefore \frac{x}{2} = 3 \qquad \therefore x = 6$

$, \frac{y}{2} = 4 \qquad \therefore y = 8$

$\therefore A(6 , 0)$, $B(0 , 8)$

$\boxed{2}$ $\because$ The slope of $\overleftrightarrow{AB} = \frac{8-0}{0-6} = \frac{-4}{3}$

$\therefore$ The equation of $\overleftrightarrow{AB}$ is : $y = \frac{-4}{3}x + c$

, $\because (0 , 8)$ satisfies the equation.

$\therefore 8 = \frac{-4}{3} \times 0 + c \qquad \therefore c = 8$

$\therefore$ The equation is : $y = \frac{-4}{3}x + 8$

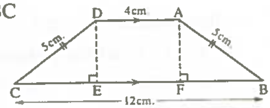
8 El-Dakahlia

1

[a] $\boxed{1}$ c $\qquad$ $\boxed{2}$ b $\qquad$ $\boxed{3}$ b

[b] Draw $\overline{AF} \perp \overline{BC}$

$, \overline{DE} \perp \overline{BC}$



$\because \overline{AD} \parallel \overline{BC}$

$, \overline{AF} \perp \overline{BC}$

$, \overline{DE} \perp \overline{BC}$

$\therefore$ AFED is a rectangle $\qquad \therefore FE = AD = 4$ cm.

$\therefore BF + EC = 8$ cm.

$\because BF = EC = 4$ cm. $(\Delta ABF \equiv \Delta DCE)$

$\therefore$ From ΔABF which is right-angled at F

$(AF)^2 = (5)^2 - (4)^2 = 9$

$\therefore AF = 3$ cm.

$\therefore DE = AF = 3$ cm. (AFED is a rectangle)

$$\therefore \frac{\tan B \cos C}{\sin^2 C + \cos^2 B} = \frac{\frac{3}{4} \times \frac{4}{5}}{\left(\frac{3}{5}\right)^2 + \left(\frac{4}{5}\right)^2} = \frac{3}{5}$$

2

[a] $\boxed{1}$ b $\qquad$ $\boxed{2}$ b $\qquad$ $\boxed{3}$ d

[b] $\boxed{1}$ $\because MB = \sqrt{(8-5)^2 + (11-7)^2} = \sqrt{9 + 16}$

$= 5$ length units

$\therefore$ The circumference $= 2 \times 5 \times 3.14$

$= 31.4$ length units.

$\boxed{2}$ Let $A(x , y)$

$\therefore (5 , 7) = \left(\frac{x+8}{2} , \frac{y+11}{2}\right)$

$\therefore \frac{x+8}{2} = 5 \qquad \therefore x + 8 = 10 \qquad \therefore x = 2$

$, \frac{y+11}{2} = 7 \qquad \therefore y + 11 = 14 \qquad \therefore y = 3$

$\therefore A(2 , 3)$

, $\because$ the slope of $\overleftrightarrow{AB} = \frac{11-3}{8-2} = \frac{4}{3}$

$\therefore$ The slope of the required straight line $= \frac{-3}{4}$

$\therefore$ Its equation is : $y = \frac{-3}{4}x + c$

, $\because A(2 , 3)$ satisfies the equation.

$\therefore 3 = \frac{-3}{4} \times 2 + c \qquad \therefore c = \frac{9}{2}$

$\therefore$ The equation is : $y = \frac{-3}{4}x + \frac{9}{2}$

3

[a] $\because$ The midpoint of $\overline{AC} = \left(\frac{-1+7}{2} , \frac{3+4}{2}\right)$

$= \left(3 , \frac{7}{2}\right)$

, the midpoint of $\overline{BD} = \left(\frac{5+1}{2} , \frac{1+6}{2}\right)$

$= \left(3 , \frac{7}{2}\right)$

$\therefore$ The midpoint of $\overline{AC}$ = the midpoint of $\overline{BD}$

$\therefore$ The two diagonals bisect each other.

$\therefore$ ABCD is a parallelogram.

[b] $\boxed{1}$ Let $A(0 , n)$, $B(n , 0)$

$\therefore$ The slope $= \frac{0-n}{n-0} = -1 \qquad \therefore k = -1$

, $\because (2 , 3)$ satisfies the equation.

$\therefore 3 = -1 \times 2 + c \qquad \therefore c = 5$

$\boxed{2}$ $\because A(0 , n)$ satisfies the equation.

$\therefore n = -1 \times 0 + 5 \qquad \therefore n = 5$

$\therefore A(0 , 5)$, $B(5 , 0)$

$\therefore$ The area of $\Delta ABO = \frac{1}{2} \times 5 \times 5$

$= \frac{25}{2}$ square units.

4

[a] $\boxed{1}$ $\because$ The intercepted part of the y-axis by $\overleftrightarrow{BC}$ is 3 units

$\therefore C = (0 , 3)$

$\therefore BC = \sqrt{(0-2)^2 + (3-1)^2} = \sqrt{4+4}$

$= 2\sqrt{2}$ length units.

$\boxed{2}$ $\because$ B (2 , 1) $\quad\therefore$ OA = 2 length units

, AB = 1 length unit

, $\because \overline{AB} \parallel \overline{OC}$, AB ≠ OC

$\therefore$ OABC is a trapezium

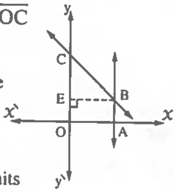
$\therefore$ The area of OABC $= \frac{1}{2}(1+3) \times 2$

$= 4$ square units.

$\boxed{3}$ Draw $\overline{BE} \perp \overline{OC}$

$\because \overline{BE} \perp \overline{OC}$, $\overline{AO} \perp \overline{OC}$

, $\overline{AB} \parallel \overline{OC}$



$\therefore$ ABEO is a rectangle

$\therefore$ OE = AB

= 1 length unit

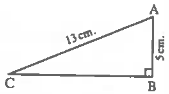
BE = OA = 2 length units

, CE = 3 − 1 = 2 length units.

In Δ BEC : $\because \tan(\angle BCE) = \frac{2}{2} = 1$

$\therefore m(\angle OCB) = 45°$

[b] $\boxed{1}$ $\because m(\angle B) = 90°$



$\therefore \sin^2 A + \cos^2 A$

$= \frac{(BC)^2}{(AC)^2} + \frac{(AB)^2}{(AC)^2}$

$= \frac{(BC)^2 + (AB)^2}{(AC)^2} = \frac{(AC)^2}{(AC)^2} = 1$

$\boxed{2}$ $\because \sin C = \frac{5}{13}$ $\qquad \therefore m(\angle C) \simeq 22° \, 37'$

5

[a] $\because$ The slope = tan 135° = − 1

$\therefore$ The equation is : $y = -x + c$

, $\because$ (3 , 4) satisfies the equation.

$\therefore 4 = -3 + c \qquad \therefore c = 7$

$\therefore$ The equation is : $y = -x + 7$

[b] $\because \tan^2 60° - \tan^2 45° = \left(\sqrt{3}\right)^2 - (1)^2$

$= 3 - 1 = 2 \qquad (1)$

, $\sin^2 60° + \cos^2 60° + 2 \sin 30°$

$= \left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{2}\right)^2 + 2 \times \frac{1}{2} = \frac{3}{4} + \frac{1}{4} + 1 = 2 \qquad (2)$

From (1) , (2) :

$\therefore \tan^2 60° - \tan^2 45° = \sin^2 60° + \cos^2 60° + 2 \sin 30°$

9 Ismailia

1

$\boxed{1}$ a $\quad \boxed{2}$ c $\quad \boxed{3}$ b $\quad \boxed{4}$ a $\quad \boxed{5}$ c $\quad \boxed{6}$ d

2

[a] $\because x \cos^2 30° = \tan^2 60° \cos^2 45°$

$\therefore x \times \left(\frac{\sqrt{3}}{2}\right)^2 = \left(\sqrt{3}\right)^2 \times \left(\frac{1}{\sqrt{2}}\right)^2$

$\therefore \frac{3}{4} x = 3 \times \frac{1}{2} \qquad \therefore x = 2$

[b] $\because$ The midpoint of $\overline{BC} = \left(\frac{3+1}{2} , \frac{7-3}{2}\right) = (2 , 2)$

$\therefore$ The slope of the required straight line $= \frac{-1-2}{5-2}$

$= -1$

$\therefore$ Its equation is : $y = -x + c$

, $\because$ A (5 , − 1) satisfies the equation.

$\therefore -1 = -5 + c \qquad \therefore c = 4$

$\therefore$ The equation is : $y = -x + 4$

3

[a] $\because AB = \sqrt{(-4-1)^2 + (2+2)^2} = \sqrt{25+16}$

$= \sqrt{41}$ length units

, $BC = \sqrt{(1+4)^2 + (6-2)^2} = \sqrt{25+16}$

$= \sqrt{41}$ length units

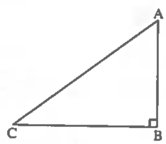
, $AC = \sqrt{(1-1)^2 + (6+2)^2} = \sqrt{0+64}$

= 8 length units

$\therefore$ AB = BC

$\therefore \Delta$ ABC is an isosceles triangle.

[b] $\because m(\angle B) = 90°$



$\therefore \frac{\sin A}{\cos C} = \frac{\frac{BC}{AC}}{\frac{BC}{AC}} = 1$

, $\because \tan D = \frac{\sin A}{\cos C} = 1$

$\therefore m(\angle D) = 45°$

4

[a] $\because L_1 \parallel L_2$ $\quad\therefore m_1 = m_2$

$\therefore \frac{1-4}{k-2} = \tan 45°$ $\quad\therefore \frac{-3}{k-2} = 1$

$\therefore k - 2 = -3$ $\quad\therefore k = -1$

[b] In Δ BED :

$\because m(\angle BED) = 90°$, $m(\angle B) = 60°$

$\therefore m(\angle BDE) = 30°$, $BE = \frac{1}{2} BD = 2$ cm.

, $\because \sin 60° = \frac{DE}{BD}$ $\quad\therefore \frac{\sqrt{3}}{2} = \frac{DE}{4}$

$\therefore DE = 2\sqrt{3}$ cm.

In Δ CDE :

$\because m(\angle CED) = 90°$, $CE = 5 - 2 = 3$ cm.

$\therefore \tan(\angle DCE) = \frac{2\sqrt{3}}{3}$

5

[a] 1 The midpoint of $\overline{AC} = \left(\frac{3-3}{2}, \frac{3-3}{2}\right) = (0, 0)$

$\therefore$ The intersection point of the diagonals is : $(0, 0)$

2 $\because$ The slope of $\overleftrightarrow{AC} = \frac{-3-3}{-3-3} = 1$

, $\because \overleftrightarrow{AC} \perp \overleftrightarrow{BD}$

$\therefore$ The slope of $\overleftrightarrow{BD} = -1$

, $\because \overleftrightarrow{BD}$ passes through $(0, 0)$

$\therefore$ The equation of $\overleftrightarrow{BD}$ is : $y = -x$

[b] $\because A(0, 2)$, $B(4, 0)$, $C(-1, 0)$

$\therefore$ The slope of $\overleftrightarrow{AB} = m_1 = \frac{2-0}{0-4} = \frac{-1}{2}$

, the slope of $\overleftrightarrow{AC} = m_2 = \frac{0-2}{-1-0} = 2$

$\therefore m_1 \times m_2 = \frac{-1}{2} \times 2 = -1$

$\therefore \overleftrightarrow{AB} \perp \overleftrightarrow{AC}$

$\therefore \Delta ABC$ is a right-angled triangle at A

, its area $= \frac{1}{2} \times 2 \times 5 = 5$ square units.

10 Suez

1

1 d 2 a 3 c 4 d 5 b 6 a

2

[a] $\because 2 \sin 30° + 4 \cos 60° = 2 \times \frac{1}{2} + 4 \times \frac{1}{2} = 3$ (1)

, $\tan^2 60° = \left(\sqrt{3}\right)^2 = 3$ (2)

From (1) , (2) :

$\therefore 2 \sin 30° + 4 \cos 60° = \tan^2 60°$

[b] $\because$ The midpoint of $\overline{AC} = \left(\frac{-1+6}{2}, \frac{-1+0}{2}\right)$

$= \left(\frac{5}{2}, \frac{-1}{2}\right)$

, the midpoint of $\overline{BD} = \left(\frac{2+3}{2}, \frac{3-4}{2}\right)$

$= \left(\frac{5}{2}, \frac{-1}{2}\right)$

$\therefore$ The midpoint of $\overline{AC}$ = the midpoint of $\overline{BD}$

$\therefore \overline{AC}$ and $\overline{BD}$ bisect each other.

3

[a] $\because \cos 3x = \frac{\sin 60° \sin 30°}{\tan 45° \sin^2 45°}$

$= \frac{\frac{\sqrt{3}}{2} \times \frac{1}{2}}{1 \times \left(\frac{1}{\sqrt{2}}\right)^2} = \frac{\frac{\sqrt{3}}{4}}{\frac{1}{2}} = \frac{\sqrt{3}}{2}$

$\therefore 3x = 30°$ $\quad\therefore x = 10°$

[b] $\because$ The slope of $\overleftrightarrow{AB} = \frac{-4+3}{5-2} = \frac{-1}{3}$

$\therefore$ The slope of the required straight line = 3

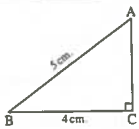
$\therefore$ Its equation is : $y = 3x + c$

, $\because (1, 2)$ satisfies the equation.

$\therefore 2 = 3 \times 1 + c$ $\quad\therefore c = -1$

$\therefore$ The equation is : $y = 3x - 1$

4



[a] $\because m(\angle C) = 90°$

$\therefore (AC)^2 = (5)^2 - (4)^2 = 9$

$\therefore AC = 3$ cm.

$\therefore \sin A \cos B + \cos A \sin B = \frac{4}{5} \times \frac{4}{5} + \frac{3}{5} \times \frac{3}{5}$

$= 1$

[b] $\because \frac{y-1}{x} = \frac{1}{3}$ $\quad\therefore y = \frac{1}{3}x + 1$

$\therefore$ The slope of the given straight line $= \frac{1}{3}$

$\therefore$ The slope of the required straight line $= \frac{1}{3}$

, $\because$ it intersects a part from the negative direction of the y-axis of length 3 units

$\therefore$ The equation is : $y = \frac{1}{3}x - 3$

5

[a] $\because AB = \sqrt{(3-0)^2+(4-0)^2} = \sqrt{9+16}$

$= 5$ length units

, $BC = \sqrt{(-4-3)^2+(3-4)^2} = \sqrt{49+1}$

$= 5\sqrt{2}$ length units

, $AC = \sqrt{(-4-0)^2+(3-0)^2} = \sqrt{16+9}$

$= 5$ length units

$\therefore$ The perimeter of $\Delta ABC = 5 + 5\sqrt{2} + 5$

$= 10 + 5\sqrt{2}$ length units.

[b] $\because \overline{AB} \parallel \overline{CD}$ $\quad \therefore m_1 = m_2$

$\therefore \frac{2+2}{3-9} = \frac{-3+x}{4+x}$ $\quad \therefore \frac{-2}{3} = \frac{-3+x}{4+x}$

$\therefore -9+3x = -8-2x$ $\quad \therefore 5x = 1$

$\therefore x = \frac{1}{5}$ $\quad \therefore C\left(\frac{-1}{5}, \frac{-1}{5}\right)$

11 Port Said

1

1 a 2 b 3 c 4 b 5 d 6 b

2

[a] $\because m_1 = \frac{4-3}{2+1} = \frac{1}{3}$

, $m_2 = \frac{1}{3}$ $\quad \therefore m_1 = m_2$

$\therefore$ The two straight lines are parallel.

[b] $\because \sin 90° = 1$ (1)

, $\sin 60° \cos 30° + \cos 60° \sin 30°$

$= \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} + \frac{1}{2} \times \frac{1}{2} = 1$ (2)

From (1) , (2) :

$\therefore \sin 90° = \sin 60° \cos 30° + \cos 60° \sin 30°$

3

[a] $\because \cos E = \frac{\cos^2 45°}{\tan 30°} = \frac{\left(\frac{1}{\sqrt{2}}\right)^2}{\frac{1}{\sqrt{3}}} = \frac{\sqrt{3}}{2}$

$\therefore m(\angle E) = 30°$

[b] $\because AB = \sqrt{(3+3)^2+(4-0)^2} = \sqrt{36+16}$

$= 2\sqrt{13}$ length units

, $BC = \sqrt{(1-3)^2+(-6-4)^2} = \sqrt{4+100}$

$= 2\sqrt{26}$ length units

, $AC = \sqrt{(1+3)^2+(-6-0)^2} = \sqrt{16+36}$

$= 2\sqrt{13}$ length units

$\therefore AB = AC$ $\quad \therefore \Delta ABC$ is an isosceles triangle.

4

[a] $\because \frac{y-1}{x} = \frac{1}{3}$ $\quad \therefore y = \frac{1}{3}x + 1$

$\therefore$ The slope of the given straight line $= \frac{1}{3}$

$\therefore$ The slope of the required straight line $= \frac{1}{3}$

, $\because$ it intercepts a part from the negative direction of the y-axis of length 3 units

$\therefore$ The equation is : $y = \frac{1}{3}x - 3$

[b] $\because$ The slope of $\overleftrightarrow{AD} = \frac{1-3}{-2-2} = \frac{1}{2}$

, the slope of $\overleftrightarrow{BC} = \frac{2+2}{6+2} = \frac{1}{2}$

$\therefore$ The slope of $\overleftrightarrow{AD}$ = the slope of $\overleftrightarrow{BC}$

$\therefore \overleftrightarrow{AD} \parallel \overleftrightarrow{BC}$ (1)

, $\because$ the slope of $\overleftrightarrow{AB} = \frac{2-3}{6-2} = \frac{-1}{4}$

, the slope of $\overleftrightarrow{CD} = \frac{1+2}{-2+2}$ is undefined

$\therefore$ The slope of $\overleftrightarrow{AB} \neq$ the slope of $\overleftrightarrow{CD}$

$\therefore \overleftrightarrow{AB}$ is not parallel to $\overleftrightarrow{CD}$ (2)

From (1) , (2) :

$\therefore$ ABCD is a trapezoid.

5

[a] $\because$ The midpoint of $\overline{BC} = \left(\frac{3+1}{2}, \frac{7-3}{2}\right) = (2, 2)$

$\therefore$ The slope of the straight line $= \frac{2+6}{2-5} = \frac{-8}{3}$

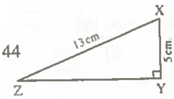
$\therefore$ Its equation is : $y = \frac{-8}{3}x + c$

, $\because (5, -6)$ satisfies the equation.

$\therefore -6 = \frac{-8}{3} \times 5 + c$ $\quad \therefore c = \frac{22}{3}$

$\therefore$ The equation is : $y = \frac{-8}{3}x + \frac{22}{3}$

[b] $\because m(\angle Y) = 90^\circ$



$\therefore (YZ)^2 = (13)^2 - (5)^2 = 144$

$\therefore YZ = 12$ cm.

$\therefore \sin X \cos Z + \cos X \sin Z$

$= \frac{12}{13} \times \frac{12}{13} + \frac{5}{13} \times \frac{5}{13} = 1$

12 Damietta

1

1 a 2 d 3 d 4 c 5 b 6 d

2

[a] $\because$ The slope of the straight line $= \frac{5-0}{0-5} = -1$

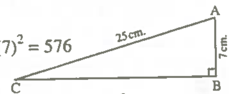
$\therefore$ Its equation is : $y = -X + c$

, $\because (0 , 5)$ satisfies the equation.

$\therefore 5 = 0 + c$ $\therefore c = 5$

$\therefore$ The equation is : $y = -X + 5$

[b] $\because m(\angle B) = 90^\circ$



$\therefore (BC)^2 = (25)^2 - (7)^2 = 576$

$\therefore BC = 24$ cm.

$\therefore \sin^2 A + \sin^2 C = \left(\frac{24}{25}\right)^2 + \left(\frac{7}{25}\right)^2 = 1$

3

[a] $\because$ The points are located on one straight line

$\therefore \frac{3-1}{a-0} = \frac{5-1}{2-0}$ $\therefore \frac{2}{a} = 2$ $\therefore a = 1$

[b] $\because$ The slope of the given straight line $= \frac{-1}{3}$

$\therefore$ The slope of the required straight line $= \frac{-1}{3}$

$\therefore$ Its equation is : $y = \frac{-1}{3} X + c$

, $\because (3 , 7)$ satisfies the equation.

$\therefore 7 = \frac{-1}{3} \times 3 + c$ $\therefore c = 8$

$\therefore$ The equation is : $y = \frac{-1}{3} X + 8$

4

[a] $\because 2 \sin X = \sin 30^\circ \cos 60^\circ + \cos 30^\circ \sin 60^\circ$

$\therefore 2 \sin X = \frac{1}{2} \times \frac{1}{2} + \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2}$

$\therefore 2 \sin X = 1$ $\therefore \sin X = \frac{1}{2}$

$\therefore X = 30^\circ$

[b] $\because$ The slope of the straight line = 2 and it intersects from the positive part of y-axis 7 units.

$\therefore$ Its equation is : $y = 2X + 7$

5

[a] $\because \tan 60^\circ = \sqrt{3}$ (1)

$, \frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ} = \frac{2 \times \frac{1}{\sqrt{3}}}{1 - \left(\frac{1}{\sqrt{3}}\right)^2} = \frac{\frac{2}{\sqrt{3}}}{1 - \frac{1}{3}} = \sqrt{3}$ (2)

From (1) , (2) :

$\therefore \tan 60^\circ = \frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ}$

[b] $\because AB = \sqrt{(-2-3)^2 + (4+1)^2} = \sqrt{25 + 25}$

$= 5\sqrt{2}$ length units

$, BC = \sqrt{(3-4)^2 + (-1-5)^2} = \sqrt{1 + 36}$

$= \sqrt{37}$ length units

$, AC = \sqrt{(-2-4)^2 + (4-5)^2} = \sqrt{36 + 1}$

$= \sqrt{37}$ length units

$\therefore BC = AC$

$\therefore \Delta ABC$ is an isosceles triangle.

13 Kafr El-Sheikh

1

1 c 2 a 3 b 4 d 5 c 6 d

2

[a] $\because AB = \sqrt{(3-1)^2 + (0-4)^2} = \sqrt{4 + 16}$

$= 2\sqrt{5}$ length units

$, BC = \sqrt{(1+1)^2 + (4-2)^2} = \sqrt{4 + 4}$

$= 2\sqrt{2}$ length units

$, AC = \sqrt{(3+1)^2 + (0-2)^2} = \sqrt{16 + 4}$

$= 2\sqrt{5}$ length units

$\therefore AB = AC$

$\therefore \Delta ABC$ is an isosceles triangle.

[b] $\sin^2 45^\circ \cos 60^\circ + \frac{1}{2} \tan 60^\circ \sin 60^\circ$

$= \left(\frac{1}{\sqrt{2}}\right)^2 \times \frac{1}{2} + \frac{1}{2} \times \sqrt{3} \times \frac{\sqrt{3}}{2}$

$= \frac{1}{4} + \frac{3}{4} = 1$

3

[a] $\because L_1 \parallel L_2$ $\therefore m_1 = m_2$

$\therefore 2 - k = \tan 45°$ $\therefore 2 - k = 1$

$\therefore k = 1$

[b] $\because \sqrt{3} \tan X = 4 \sin 60° \cos 30°$

$\therefore \sqrt{3} \tan X = 4 \times \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2}$

$\therefore \sqrt{3} \tan X = 3$ $\therefore \tan X = \sqrt{3}$

$\therefore X = 60°$

4

[a] $\because \sqrt{(2-X)^2 + (5-3)^2} = 2\sqrt{2}$ (Squaring both sides)

$\therefore (2 - X)^2 + (2)^2 = 8$

$\therefore X^2 - 4X + 4 + 4 = 8$ $\therefore X^2 - 4X = 0$

$\therefore X(X - 4) = 0$ $\therefore X = 0$ or $X = 4$

[b] $\because$ The slope $= 3$

$\therefore$ The equation is : $y = 3X + c$

, $\because (5, -2)$ satisfies the equation.

$\therefore -2 = 3 \times 5 + c$ $\therefore c = -17$

$\therefore$ The equation is : $y = 3X - 17$

5

[a] Let B (X, y)

$\therefore (2, 3) = \left(\frac{X-1}{2}, \frac{y+3}{2}\right)$

$\therefore \frac{X-1}{2} = 2$ $\therefore X - 1 = 4$ $\therefore X = 5$

, $\frac{y+3}{2} = 3$ $\therefore y + 3 = 6$ $\therefore y = 3$

$\therefore$ B $(5, 3)$

[b] $\because \angle A, \angle C$ are complementary angles

$\therefore \sin A = \cos C$

$\therefore \sin A + \cos C = \sin A + \sin A = 1$

$\therefore \sin A = \frac{1}{2}$ $\therefore m(\angle A) = 30°$

14 El-Beheira

1

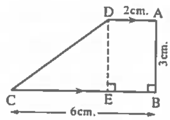
1 c 2 b 3 b 4 b 5 b 6 c

2

[a] $\because m_1 = \frac{4-3}{2+1} = \frac{1}{3}$, $m_2 = \frac{1}{3}$ $\therefore m_1 = m_2$

$\therefore$ The two straight lines are parallel.

[b] Draw $\overline{DE} \perp \overline{BC}$



$\because \overline{AD} \parallel \overline{BC}$, $\overline{AB} \perp \overline{BC}$

, $\overline{DE} \perp \overline{BC}$

$\therefore$ ABED is a rectangle

$\therefore$ DE = AB = 3 cm.

, BE = AD = 2 cm. $\therefore$ CE = 6 − 2 = 4 cm.

In Δ DEC : $\because m(\angle DEC) = 90°$

$\therefore (DC)^2 = (3)^2 + (4)^2 = 25$ $\therefore$ DC = 5 cm.

$\therefore \cos(\angle BCD) = \frac{4}{5}$

3

[a] $\because$ The slope $= 3$

$\therefore$ The equation is : $y = 3X + c$

, $\because (1, 2)$ satisfies the equation.

$\therefore 2 = 3 \times 1 + c$ $\therefore c = -1$

$\therefore$ The equation is : $y = 3X - 1$

[b] $\because 2 \sin X = \tan^2 60° - 2 \tan 45°$

$\therefore 2 \sin X = \left(\sqrt{3}\right)^2 - 2 \times 1$ $\therefore 2 \sin X = 1$

$\therefore \sin X = \frac{1}{2}$ $\therefore X = 30°$

4

[a] $\because L_1 \perp L_2$ $\therefore m_1 \times m_2 = -1$

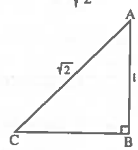
$\therefore \frac{k-1}{2-3} \times \tan 45° = -1$ $\therefore (1 - k) \times 1 = -1$

$\therefore 1 - k = -1$ $\therefore k = 2$

[b] $\because \sqrt{2}\,AB = AC$ $\therefore \frac{AB}{AC} = \frac{1}{\sqrt{2}}$

Let AB = 1 length unit

, AC $= \sqrt{2}$ length unit



, $\because m(\angle B) = 90°$

$\therefore (BC)^2 = \left(\sqrt{2}\right)^2 - (1)^2 = 1$

$\therefore$ BC = 1 length unit

$\therefore \sin C = \frac{1}{\sqrt{2}}$, $\cos C = \frac{1}{\sqrt{2}}$, $\tan C = 1$

5

[a] $\because$ AB = BC

$\therefore \sqrt{(X-3)^2 + (3-2)^2} = \sqrt{(3-5)^2 + (2-1)^2}$

(Squaring both sides)

$\therefore (X - 3)^2 + 1 = 4 + 1$

$\therefore X^2 - 6X + 9 + 1 - 4 - 1 = 0$

$\therefore X^2 - 6X + 5 = 0$ $\therefore (X - 5)(X - 1) = 0$

$\therefore X = 5$ or $X = 1$ (refused because $B \notin \overleftrightarrow{AC}$)

[b] $\because AB = \sqrt{(2-6)^2 + (-4-0)^2}$

$= \sqrt{16+16} = \sqrt{32} = 4\sqrt{2}$ length unit

, $BC = \sqrt{(-4-2)^2 + (2+4)^2} = \sqrt{36+36} = \sqrt{72}$

$= 6\sqrt{2}$ length unit

, $CA = \sqrt{(6+4)^2 + (0-2)^2} = \sqrt{100+4} = \sqrt{104}$

$= 2\sqrt{26}$ length unit

$\therefore (AB)^2 + (BC)^2 = 32 + 72 = 104 = (CA)^2$

$\therefore \Delta ABC$ is right-angled at B

Let E be the midpoint of $\overline{AC}$

$\therefore E = \left(\frac{6-4}{2}, \frac{0+2}{2}\right) = (1, 1)$

$\because$ In the rectangle the two diagonals bisect each other

$\therefore$ E is the midpoint of $\overline{BD}$

Let $D(x, y)$

$\therefore (1, 1) = \left(\frac{x+2}{2}, \frac{y-4}{2}\right)$ $\quad\therefore \frac{x+2}{2} = 1$

$\therefore x + 2 = 2$ $\quad\therefore x = 0$

, $\frac{y-4}{2} = 1$ $\quad\therefore y - 4 = 2$

$\therefore y = 6$ $\quad\therefore D(0, 6)$

15 El-Fayoum

1

1 b   2 d   3 c   4 c   5 c   6 c

2

[a] $\because MA = \sqrt{(-1-3)^2 + (2+1)^2} = \sqrt{16+9}$

$= 5$ length units

, $MB = \sqrt{(-1+4)^2 + (2-6)^2} = \sqrt{9+16}$

$= 5$ length units

and $MC = \sqrt{(-1-2)^2 + (2+2)^2} = \sqrt{9+16}$

$= 5$ length units

$\therefore MA = MB = MC$

$\therefore$ A, B and C lie on the circle M

, the circumference $= 2 \times 3.14 \times 5$

$= 31.4$ length units.

[b] $\because \tan^2 60° - \tan^2 45° = \left(\sqrt{3}\right)^2 - (1)^2 = 2$ (1)

, $\sin^2 60° + \cos^2 60° + 2 \sin 30°$

$= \left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{2}\right)^2 + 2 \times \frac{1}{2} = 2$ (2)

From (1), (2):

$\therefore \tan^2 60° - \tan^2 45° = \sin^2 60° + \cos^2 60° + 2 \sin 30°$

3

[a] $\because$ The slope of $\overleftrightarrow{AB} = \frac{5-3}{3-1} = 1$

$\therefore$ The slope of the required straight line $= -1$

$\therefore$ Its equation is : $y = -x + c$

, $\because$ the midpoint of $\overline{AB}$

$= \left(\frac{1+3}{2}, \frac{3+5}{2}\right) = (2, 4)$

, $\because$ the required straight line passes through the midpoint of $\overline{AB}$

$\therefore 4 = -2 + c$ $\quad\therefore c = 6$

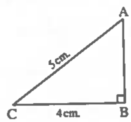
$\therefore$ The equation of the required straight line is :

$y = -x + 6$

[b] $\because m(\angle B) = 90°$

$\therefore (AB)^2 = (5)^2 - (4)^2 = 9$

$\therefore AB = 3$ cm.



$\therefore 2\cos^2 C + \sin^2 A$

$= 2\left(\frac{4}{5}\right)^2 + \left(\frac{4}{5}\right)^2 = \frac{48}{25}$

4

[a] $\because$ The midpoint of $\overline{AC} = \left(3 \quad , \frac{-2-7}{2}\right)$

$= \left(\frac{3}{2} \quad 9\right)$

, the midpoint of $\overline{BD} = \left(\frac{-5+8}{2}, \frac{-9}{2}\right)$

$= \left(\frac{3}{2}, \frac{-9}{2}\right)$

$\therefore$ The midpoint of $\overline{AC}$ = the midpoint of $\overline{BD}$

$\therefore \overline{AC}$ and $\overline{BD}$ bisect each other

$\therefore$ The points A, B, C and D are the vertices of a parallelogram.

[b] $\because 4x = \cos^2 30° \tan^2 30° \tan^2 45°$

$\therefore 4x = \left(\frac{\sqrt{3}}{2}\right)^2 \times \left(\frac{1}{\sqrt{3}}\right)^2 \times (1)^2$

$\therefore 4x = \frac{3}{4} \times \frac{1}{3} \times 1$ $\quad\therefore 4x = \frac{1}{4}$ $\quad\therefore x = \frac{1}{16}$

5

[a] $\because$ The two straight lines are perpendicular

$\therefore m_1 \times m_2 = -1$ $\qquad \therefore \frac{3}{4} \times \frac{-4}{k} = -1$

$\therefore \frac{3}{k} = 1$ $\qquad \therefore k = 3$

[b] $\because$ The straight line passes through (1 , 0) , (0 , 4)

$\therefore$ Its slope $= \frac{4-0}{0-1} = -4$

$\therefore$ Its equation is : $y = -4x + c$

, $\because$ (0 , 4) satisfies the equation.

$\therefore 4 = -4 \times 0 + c$ $\qquad \therefore c = 4$

$\therefore$ The equation is : $y = -4x + 4$

16 Beni Suef

1

1 b 2 c 3 d 4 a 5 d 6 b

2

[a] Let B (x , y)

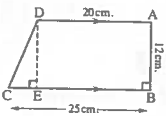
$\therefore (6 , -4) = \left(\frac{5+x}{2} , \frac{-3+y}{2}\right)$

$\therefore \frac{5+x}{2} = 6$ $\qquad \therefore 5 + x = 12$ $\qquad \therefore x = 7$

, $\frac{-3+y}{2} = -4$ $\qquad \therefore -3 + y = -8$ $\quad \therefore y = -5$

$\therefore$ B (7 , −5)

[b] Draw $\overline{DE} \perp \overline{BC}$



, $\because \overline{AD} \parallel \overline{BC}$, $\overline{AB} \perp \overline{BC}$

, $\overline{DE} \perp \overline{BC}$

$\therefore$ ABED is a rectangle

$\therefore$ DE = AB = 12 cm.

, BE = AD = 20 cm. $\qquad \therefore$ CE = 25 − 20 = 5 cm.

In Δ DEC : $\because m(\angle DEC) = 90^\circ$

$\therefore (DC)^2 = (12)^2 + (5)^2 = 169$

$\therefore$ DC = 13 cm. $\qquad$, $\because \tan C = \frac{12}{5}$

$\therefore m(\angle C) \simeq 67^\circ \, 22' \, 48''$

3

[a] $\because \frac{1}{2} \sin 60^\circ = \frac{1}{2} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{4}$ $\qquad$ (1)

, $\sin 30^\circ \cos 30^\circ = \frac{1}{2} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{4}$ $\qquad$ (2)

From (1) , (2) :

$\therefore \frac{1}{2} \sin 60^\circ = \sin 30^\circ \cos 30^\circ$

[b] $\because$ The slope = 2

$\therefore$ The equation of the straight line is : $y = 2x + c$

, $\because$ (2 , 3) satisfies the equation.

$\therefore 3 = 2 \times 2 + c$ $\qquad \therefore c = -1$

$\therefore$ The equation is : $y = 2x - 1$

4

[a] $\because \cos E \tan 30^\circ = \sin^2 45^\circ$

$\therefore \cos E \times \frac{1}{\sqrt{3}} = \left(\frac{1}{\sqrt{2}}\right)^2$

$\therefore \cos E = \frac{\sqrt{3}}{2}$ $\qquad \therefore m(\angle E) = 30^\circ$

[b] $\because m_1 = \frac{3+1}{6-2} = 1$, $m_2 = \tan 45^\circ = 1$

$\therefore m_1 = m_2$

$\therefore$ The two straight lines are parallel.

5

[a] $\because MA = \sqrt{(-1-3)^2 + (2+1)^2} = \sqrt{16+9}$

$= 5$ length units

, $MB = \sqrt{(-1+4)^2 + (2-6)^2} = \sqrt{9+16}$

$= 5$ length units

and $MC = \sqrt{(-1-2)^2 + (2+2)^2} = \sqrt{9+16}$

$= 5$ length units

$\therefore$ MA = MB = MC

$\therefore$ A , B and C are located on the circle M

[b] The slope $= \frac{2}{3}$

and the intersected part $= \frac{5}{3}$ units

from the negative direction of the y-axis.

17 El-Menia

1

1 b 2 b 3 c 4 d 5 b 6 d

2

[a] $\cos 60^\circ \sin 30^\circ - \sin 60^\circ \tan 60^\circ + \cos^2 30^\circ$

$= \frac{1}{2} \times \frac{1}{2} - \frac{\sqrt{3}}{2} \times \sqrt{3} + \left(\frac{\sqrt{3}}{2}\right)^2$

$= \frac{1}{4} - \frac{3}{2} + \frac{3}{4} = -\frac{1}{2}$

[b] $\because$ The slope of the given straight line

$= \frac{-4+3}{5-2} = \frac{-1}{3}$

$\therefore$ The slope of the required straight line = 3

$\therefore$ Its equation is : $y = 3x + c$

, $\because$ (1 , 2) satisfies the equation.

$\therefore 2 = 3 \times 1 + c$ $\quad\therefore c = -1$

$\therefore$ The equation is : $y = 3x - 1$

3

[a] $\because 2 \sin x = \tan^2 60° - 2 \tan 45°$

$\therefore 2 \sin x = \left(\sqrt{3}\right)^2 - 2 \times 1$ $\quad\therefore 2 \sin x = 1$

$\therefore \sin x = \frac{1}{2}$ $\quad\therefore x = 30°$

[b] $\because m(\angle A) = 90°$

$\therefore (AB)^2 = (25)^2 - (15)^2 = 400$

$\therefore AB = 20$ cm.

$\therefore \cos C \cos B - \sin C \sin B = \frac{15}{25} \times \frac{20}{25} - \frac{20}{25} \times \frac{15}{25}$
$= 0$

4

[a] $\because$ The slope of $\overleftrightarrow{AB} = m_1 = \frac{0+4}{1+1} = 2$

, the slope of $\overleftrightarrow{BC} = m_2 = \frac{2-0}{2-1} = 2$

$\therefore m_1 = m_2$ $\quad\therefore \overleftrightarrow{AB} \parallel \overleftrightarrow{BC}$

, $\because$ B is a common point

$\therefore$ A , B , C are collinear.

[b] Let B (x , y) $\quad\therefore (6 , -4) = \left(\frac{5+x}{2} , \frac{-3+y}{2}\right)$

$\therefore \frac{5+x}{2} = 6$ $\quad\therefore 5 + x = 12$ $\quad\therefore x = 7$

, $\frac{-3+y}{2} = -4$ $\quad\therefore -3 + y = -8$ $\quad\therefore y = -5$

$\therefore$ B (7 , −5)

5

[a] $\because m_1 = \tan 45° = 1$, $m_2 = 1$

$\therefore m_1 = m_2$

$\therefore$ The two straight lines are parallel.

[b] $\because \sqrt{(a+2)^2 + (7-3)^2} = 5$ (Squaring both sides)

$\therefore (a+2)^2 + (4)^2 = 25$

$\therefore a^2 + 4a + 4 + 16 - 25 = 0$

$\therefore a^2 + 4a - 5 = 0$ $\quad\therefore (a-1)(a+5) = 0$

$\therefore a = 1$ or $a = -5$

18 Assiut

1

1 c 2 d 3 c 4 a 5 c 6 b

2

[a] $\because m(\angle C) = 90°$

$\therefore (AC)^2 = (13)^2 - (12)^2 = 25$

$\therefore AC = 5$ cm.

$\therefore \sin A \cos B + \cos A \sin B = \frac{12}{13} \times \frac{12}{13} + \frac{5}{13} \times \frac{5}{13}$
$= 1$

[b] $\because AB = \sqrt{(5-1)^2 + (1-1)^2} = \sqrt{16} = 4$ length units

, $BC = \sqrt{(3-5)^2 + (4-1)^2} = \sqrt{4+9}$
$= \sqrt{13}$ length units

, $AC = \sqrt{(3-1)^2 + (4-1)^2} = \sqrt{4+9} = \sqrt{13}$ length units.

$\therefore BC = AC$ $\quad\therefore \Delta ABC$ is isosceles.

3

[a] $\because 2 \sin x = \tan^2 60° - 4 \sin 30°$

$\therefore 2 \sin x = \left(\sqrt{3}\right)^2 - 4 \times \frac{1}{2}$ $\quad\therefore 2 \sin x = 1$

$\therefore \sin x = \frac{1}{2}$ $\quad\therefore x = 30°$

[b] $\because$ The midpoint of $\overline{AC} = \left(\frac{3+1}{2} , \frac{2+4}{2}\right) = (2 , 3)$

$\therefore$ The point of intersection of the diagonals is : (2 , 3)

Let D (x , y)

$\therefore (2 , 3) = \left(\frac{4+x}{2} , \frac{-5+y}{2}\right)$

$\therefore \frac{4+x}{2} = 2$ $\quad\therefore 4 + x = 4$ $\quad\therefore x = 0$

, $\frac{-5+y}{2} = 3$

$\therefore -5 + y = 6$ $\quad\therefore y = 11$ $\quad\therefore$ D (0 , 11)

4

[a] $\cos 60° + \cos^2 30° + \tan^2 45°$

$= \frac{1}{2} + \left(\frac{\sqrt{3}}{2}\right)^2 + (1)^2 = \frac{1}{2} + \frac{3}{4} + 1 = \frac{9}{4}$

[b] $\because m_1 = \frac{4-3}{\sqrt{3} - 2\sqrt{3}} = \frac{-1}{\sqrt{3}}$, $m_2 = \tan 60° = \sqrt{3}$

$\therefore m_1 \times m_2 = \frac{-1}{\sqrt{3}} \times \sqrt{3} = -1$

$\therefore$ The two straight lines are perpendicular.

5

[a] $\because$ The slope of the given straight line $= \frac{-1}{3}$

$\therefore$ The slope of the required straight line $= \frac{-1}{3}$

$\therefore$ Its equation is : $y = \frac{-1}{3}x + c$

, $\because$ (3 , – 5) satisfies the equation.

$\therefore -5 = \frac{-1}{3} \times 3 + c$ $\qquad \therefore c = -4$

$\therefore$ The equation is : $y = \frac{-1}{3}x - 4$

[b] $\because \frac{y-1}{x} = \frac{1}{2}$

$\therefore y = \frac{1}{2}x + 1$

$\therefore$ The slope $= \frac{1}{2}$ and the intercepted part equals 1 unit from the positive direction of the y-axis.

19 Souhag

1

1 c 2 b 3 d 4 a 5 c 6 d

2

[a] $\because \cos x = 2\cos^2 30° - 1$

$\therefore \cos x = 2 \times \left(\frac{\sqrt{3}}{2}\right)^2 - 1$ $\qquad \therefore \cos x = 2 \times \frac{3}{4} - 1$

$\therefore \cos x = \frac{1}{2}$ $\qquad \therefore x = 60°$

[b] $\because$ The slope of $\overleftrightarrow{AB} = m_1 = \frac{-2-4}{-1-1} = 3$

, the slope of $\overleftrightarrow{BC} = m_2 = \frac{-3+2}{2+1} = \frac{-1}{3}$

$\therefore m_1 \times m_2 = 3 \times \frac{-1}{3} = -1$ $\qquad \therefore \overleftrightarrow{AB} \perp \overleftrightarrow{BC}$

$\therefore \Delta ABC$ is right-angled at B

3

[a] 1 $\because m(\angle C) = 90°$

$\therefore (AC)^2 = (13)^2 - (12)^2 = 25$ $\qquad \therefore AC = 5$ cm.

2 $\sin A \cos B + \cos A \sin B$

$= \frac{12}{13} \times \frac{12}{13} + \frac{5}{13} \times \frac{5}{13} = 1$

[b] $\because$ The slope = 2

$\therefore$ The equation of the straight line is : $y = 2x + c$

, $\because$ (1 , 0) satisfies the equation.

$\therefore 0 = 2 \times 1 + c$ $\qquad \therefore c = -2$

$\therefore$ The equation is : $y = 2x - 2$

4

[a] $\because 2\sin 30° = 2 \times \frac{1}{2} = 1$ $\qquad (1)$

, $\tan^2 60° - 2\tan 45° = \left(\sqrt{3}\right)^2 - 2 \times 1 = 1$ $\qquad (2)$

From (1) , (2) : $\therefore 2\sin 30° = \tan^2 60° - 2\tan 45°$

[b] $\because$ The slope of the straight line $= \frac{-3-3}{-1-1} = 3$

$\therefore$ Its equation is : $y = 3x + c$

, $\because$ (1 , 3) satisfies the equation.

$\therefore 3 = 3 \times 1 + c$ $\qquad \therefore c = 0$

$\therefore$ The equation is : $y = 3x$

, $\because c = 0$

$\therefore$ The straight line passes through the origin point.

5

[a] $\because$ The slope of $\overleftrightarrow{AB} = m_1 = \frac{5+1}{6+3} = \frac{2}{3}$

, the slope of $\overleftrightarrow{BC} = m_2 = \frac{3-5}{3-6} = \frac{2}{3}$

$\therefore m_1 = m_2$ $\qquad \therefore \overleftrightarrow{AB} \parallel \overleftrightarrow{BC}$

, $\because$ B is a common point

$\therefore$ A , B , C are collinear.

[b] $\because m_1 = \frac{5+2}{4+3} = 1$, $m_2 = \tan 45° = 1$

$\therefore m_1 = m_2$

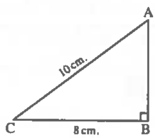
$\therefore$ The two straight lines are parallel.

20 Qena

1

1 b 2 c 3 a 4 b 5 c 6 b

2



[a] $\because m(\angle B) = 90°$

$\therefore (AB)^2 = (10)^2 - (8)^2 = 36$

$\therefore AB = 6$ cm.

$\therefore \sin^2 A + 1$

$= \left(\frac{8}{10}\right)^2 + 1 = \frac{41}{25}$ $\qquad (1)$

, $2\cos^2 C + \cos^2 A = 2 \times \left(\frac{8}{10}\right)^2 + \left(\frac{6}{10}\right)^2 = \frac{41}{25}$ $\qquad (2)$

From (1) , (2) : $\therefore \sin^2 A + 1 = 2\cos^2 C + \cos^2 A$

[b] $\because$ The slope of $\overleftrightarrow{AB} = m_1 = \frac{-1-1}{0-1} = 2$

, the slope of $\overleftrightarrow{BC} = m_2 = \frac{3+1}{2-0} = 2$

$\therefore m_1 = m_2$ $\qquad \therefore \overleftrightarrow{AB} \parallel \overleftrightarrow{BC}$

, $\because$ B is a common point

$\therefore$ A , B , C are collinear.

3

[a] $\because \sin x \tan 30^\circ = \sin^2 45^\circ$

$\therefore \sin x \times \frac{1}{\sqrt{3}} = \left(\frac{1}{\sqrt{2}}\right)^2 \quad \therefore \sin x = \frac{\sqrt{3}}{2}$

$\therefore x = 60^\circ$

[b] $\because m_1 = \frac{4-3}{2+1} = \frac{1}{3}$, $m_2 = \frac{1}{3}$

$\therefore m_1 = m_2$

$\therefore$ The two straight lines are parallel.

4

[a] $\because \sin 60^\circ = \frac{\sqrt{3}}{2}$ (1)

, $2 \sin 30^\circ \cos 30^\circ = 2 \times \frac{1}{2} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2}$ (2)

From (1) , (2) : $\therefore \sin 60^\circ = 2 \sin 30^\circ \cos 30^\circ$

[b] $\because AB = \sqrt{(6-5)^2 + (-2-3)^2} = \sqrt{1+25}$

$= \sqrt{26}$ length units

, $BC = \sqrt{(1-6)^2 + (-1+2)^2} = \sqrt{25+1}$

$= \sqrt{26}$ length units

, $CD = \sqrt{(0-1)^2 + (4+1)^2} = \sqrt{1+25}$

$= \sqrt{26}$ length units

, $DA = \sqrt{(5-0)^2 + (3-4)^2} = \sqrt{25+1}$

$= \sqrt{26}$ length units

$\therefore AB = BC = CD = DA$

$\therefore$ ABCD is a rhombus

, $\because AC = \sqrt{(1-5)^2 + (-1-3)^2} = \sqrt{16+16}$

$= 4\sqrt{2}$ length units

, $BD = \sqrt{(0-6)^2 + (4+2)^2} = \sqrt{36+36}$

$= 6\sqrt{2}$ length units

$\therefore$ The area of the rhombus $= \frac{1}{2}$ AC × BD

$= \frac{1}{2} \times 4\sqrt{2} \times 6\sqrt{2}$

= 24 square units.

5

[a] $\because AB = \sqrt{(3+3)^2 + (4-0)^2} = \sqrt{36+16}$

$= 2\sqrt{13}$ length units

, $BC = \sqrt{(1-3)^2 + (-6-4)^2} = \sqrt{4+100}$

$= 2\sqrt{26}$ length units

, $CA = \sqrt{(-3-1)^2 + (0+6)^2} = \sqrt{16+36}$

$= 2\sqrt{13}$ length units

$\therefore AB = AC$

$\therefore \Delta ABC$ is an isosceles triangle and its vertex is A

Let D be the midpoint of $\overline{BC}$ (The base of ΔABC)

$\therefore D = \left(\frac{3+1}{2}, \frac{4-6}{2}\right) = (2, -1)$

$\therefore AD = \sqrt{(2+3)^2 + (-1-0)^2} = \sqrt{25+1}$

$= \sqrt{26}$ length units

$\therefore$ The length of the segment perpendicular to $\overline{BC}$ from A $= \sqrt{26}$ length units.

[b] $\because$ The midpoint of $\overline{AC} = \left(\frac{3+0}{2}, \frac{2-3}{2}\right)$

$= \left(1\frac{1}{2}, -\frac{1}{2}\right)$

$\therefore$ The point of intersection of the two diagonals is $\left(1\frac{1}{2}, -\frac{1}{2}\right)$

and let D (x , y)

$\because$ The midpoint of $\overline{AC}$ = the midpoint of $\overline{BD}$

$\therefore \left(1\frac{1}{2}, -\frac{1}{2}\right) = \left(\frac{x+4}{2}, \frac{y-5}{2}\right)$

$\therefore \frac{x+4}{2} = 1\frac{1}{2} \quad \therefore x+4 = 3 \quad \therefore x = -1$

, $\frac{y-5}{2} = -\frac{1}{2} \quad \therefore y-5 = -1 \quad \therefore y = 4$

$\therefore D(-1 , 4)$

21 Luxor

1

1 b 2 c 3 c 4 b 5 d 6 c

2

[a] $\because \sqrt{(3a-1-a)^2 + (1-5)^2} = 5$ (Squaring both sides)

$\therefore (2a-1)^2 + (-4)^2 = 25$

$\therefore 4a^2 - 4a + 1 + 16 - 25 = 0$

$\therefore 4a^2 - 4a - 8 = 0 \quad \therefore a^2 - a - 2 = 0$

$\therefore (a-2)(a+1) = 0 \quad \therefore a = 2$ or $a = -1$

[b] $\because 3 \tan x - 4 \sin^2 30^\circ = 8 \cos^2 60^\circ$

$\therefore 3 \tan x - 4 \times \left(\frac{1}{2}\right)^2 = 8 \times \left(\frac{1}{2}\right)^2$

$\therefore 3 \tan x = 2 + 1 \quad \therefore \tan x = 1 \quad \therefore x = 45^\circ$

3

[a] $\because$ The slope of the given straight line $= \frac{-2}{3}$

$\therefore$ The slope of the required straight line $= \frac{-2}{3}$

$\therefore$ Its equation is : $y = \frac{-2}{3}x + c$

, $\because$ (1 , 2) satisfies the equation.

$\therefore 2 = \frac{-2}{3} \times 1 + c \qquad \therefore c = \frac{8}{3}$

$\therefore$ The equation is : $y = \frac{-2}{3}x + \frac{8}{3}$

[b] $\because m = \frac{4\sqrt{3} - \sqrt{3}}{1 + 2} = \sqrt{3} \quad \therefore \tan\theta = \sqrt{3} \quad \therefore \theta = 60°$

4

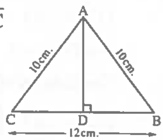
[a] $\because AB = \sqrt{(-2-4)^2 + (7+1)^2} = \sqrt{36 + 64}$

$= 10$ length units

$\therefore r = \frac{1}{2} AB = 5$ length units

$\therefore$ The area $= 3.14 \times (5)^2 = 78.5$ square units.

[b] 1 $\because AB = AC$, $\overline{AD} \perp \overline{BC}$



$\therefore BD = CD = 6$ cm.

In ΔADC :

$\because m(\angle ADC) = 90°$

$\therefore (AD)^2 = (10)^2 - (6)^2 = 64$

$\therefore AD = 8$ cm.

$\therefore \sin^2 C + \cos^2 C = \left(\frac{8}{10}\right)^2 + \left(\frac{6}{10}\right)^2 = 1$

2 $\because m(\angle B) = m(\angle C) \qquad \therefore \sin B = \sin C$

$\therefore \sin B + \cos C = \sin C + \cos C$

$= \frac{8}{10} + \frac{6}{10} = \frac{14}{10} > 1$

5

[a] $\because \overleftrightarrow{AB}$ // y-axis $\qquad \therefore 3 - x = 0 \qquad \therefore x = 3$

[b] 1 In ΔAMB : $\because m(\angle AMB) = 90°$

$\therefore \cos(\angle BAM) = \frac{4}{5}$

$\therefore m(\angle BAC) \simeq 36° \, 52' \, 12''$

$\therefore m(\angle BAD) = 73° \, 44' \, 24''$

2 $\because (BM)^2 = (5)^2 - (4)^2 = 9 \qquad \therefore BM = 3$ cm.

$\therefore$ The area $= \frac{1}{2} \times 8 \times 6 = 24 \text{ cm}^2$.

22 Aswan

1

1 c 2 b 3 d 4 c 5 c 6 b

2

[a] $\because 2\sin x = \tan^2 60° - 2\tan^2 45°$

$\therefore 2\sin x = \left(\sqrt{3}\right)^2 - 2 \times (1)^2 \qquad \therefore 2\sin x = 1$

$\therefore \sin x = \frac{1}{2} \qquad \therefore x = 30°$

[b] $\because$ The slope of $\overleftrightarrow{AB} = \frac{5-3}{3-1} = 1$

$\therefore$ The slope of the required straight line $= -1$

$\therefore$ Its equation is : $y = -x + c$

, $\because$ the midpoint of $\overline{AB} = \left(\frac{1+3}{2}, \frac{3+5}{2}\right)$

$= (2, 4)$

, the required straight line passes through the midpoint of $\overline{AB}$

$\therefore 4 = -2 + c \qquad \therefore c = 6$

$\therefore$ The equation of the required straight line is :

$y = -x + 6$

3

[a] $\because (4, 2) = \left(\frac{2+6}{2}, \frac{4+y}{2}\right)$

$\therefore \frac{4+y}{2} = 2 \qquad \therefore 4 + y = 4 \qquad \therefore y = 0$

[b] $\because$ The slope of $\overleftrightarrow{AB} = m_1 = \frac{3+1}{2+1} = \frac{4}{3}$

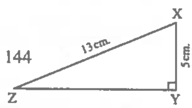
, the slope of $\overleftrightarrow{BC} = m_2 = \frac{0-3}{6-2} = \frac{-3}{4}$

$\therefore m_1 \times m_2 = \frac{4}{3} \times \frac{-3}{4} = -1 \qquad \therefore \overleftrightarrow{AB} \perp \overleftrightarrow{BC}$

$\therefore \Delta ABC$ is right-angled at B

4

[a] $\because m(\angle Y) = 90°$



$\therefore (YZ)^2 = (13)^2 - (5)^2 = 144$

$\therefore YZ = 12$ cm.

1 $\tan X \tan Z = \frac{12}{5} \times \frac{5}{12} = 1$

2 $\cos X \cos Z - \sin X \sin Z$

$= \frac{5}{13} \times \frac{12}{13} - \frac{12}{13} \times \frac{5}{13} = 0$

[b] $\because$ The straight line passes through the points (1 , 0) , (0 , 4)

$\therefore$ Its slope $= \frac{4-0}{0-1} = -4$

$\therefore$ Its equation is : $y = -4X + c$

, $\because$ the straight line intercepts 4 units from the positive part of y-axis

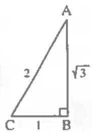
$\therefore$ Its equation is : $y = -4X + 4$

5

[a] $\because m_1 = \frac{3-4}{-1-2} = \frac{1}{3}$, $m_2 = \frac{1}{3}$ $\therefore m_1 = m_2$

$\therefore$ The two straight lines are parallel.

[b] $\because 2\,AB = \sqrt{3}\,AC$ $\therefore \frac{AB}{AC} = \frac{\sqrt{3}}{2}$



Let $AB = \sqrt{3}$ length units

, $AC = 2$ length units

$\therefore BC = 1$ length units

$\therefore \sin C = \frac{\sqrt{3}}{2}$, $\cos C = \frac{1}{2}$, $\tan C = \sqrt{3}$

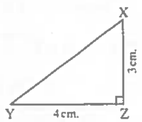
23 New Valley

1

1 d 2 b 3 c 4 a 5 d 6 c

2

[a] $\because m(\angle Z) = 90°$



$\therefore (XY)^2 = (3)^2 + (4)^2 = 25$

$\therefore XY = 5$ cm.

1 $\tan X \tan Y = \frac{4}{3} \times \frac{3}{4} = 1$

2 $\sin^2 X + \cos^2 X = \left(\frac{4}{5}\right)^2 + \left(\frac{3}{5}\right)^2 = 1$

[b] $\because AB = \sqrt{(1-3)^2 + (5-3)^2} = \sqrt{4+4}$

$= 2\sqrt{2}$ length units

, $BC = \sqrt{(1-1)^2 + (3-5)^2} = \sqrt{0+4}$

$= 2$ length units

, $AC = \sqrt{(1-3)^2 + (3-3)^2} = \sqrt{4+0}$

$= 2$ length units

$\therefore BC = AC$

$\therefore \Delta ABC$ is an isosceles triangle

, $\because (AB)^2 = \left(2\sqrt{2}\right)^2 = 8$

, $(BC)^2 + (AC)^2 = (2)^2 + (2)^2 = 8$

$\therefore (AB)^2 = (BC)^2 + (AC)^2$

$\therefore \Delta ABC$ is a right-angled triangle at C

3

[a] 1 $\because \tan X = 4 \sin 30° \cos 60°$

$\therefore \tan X = 4 \times \frac{1}{2} \times \frac{1}{2} = 1$ $\therefore X = 45°$

2 $\sin 45° = \frac{1}{\sqrt{2}}$

[b] $\because$ The slope of the straight line = 2

$\therefore$ Its equation is : $y = 2X + c$

, $\because$ (1 , 0) satisfies the equation.

$\therefore 0 = 2 \times 1 + c$ $\therefore c = -2$

$\therefore$ The equation is : $y = 2X - 2$

4

[a] 1 $\because AB = AC$, $\overline{AD} \perp \overline{BC}$

$\therefore BD = CD = 6$ cm.

In ΔADB : $\because m(\angle ADB) = 90°$

$\therefore \cos B = \frac{6}{10} = \frac{3}{5}$

2 $m(\angle B) \simeq 53° \; 7' \; 48''$

3 $\because \sin(90° - B) = \cos B$

$\therefore \sin(90° - B) = \frac{3}{5}$

[b] 1 $\because$ The midpoint of $\overline{AC} = \left(\frac{-2+4}{2}, \frac{3-3}{2}\right)$

$= (1 , 0)$

$\therefore$ The point of intersection of the diagonals $= (1 , 0)$

2 Let D (X , y)

$\therefore (1 , 0) = \left(\frac{-1+X}{2}, \frac{-2+y}{2}\right)$

$\therefore \frac{-1+X}{2} = 1$ $\therefore -1 + X = 2$ $\therefore X = 3$

, $\frac{-2+y}{2} = 0$ $\therefore -2 + y = 0$ $\therefore y = 2$

$\therefore$ D (3 , 2)

5

[a] $\because L_1 \parallel L_2$ $\therefore m_1 = m_2$ $\therefore \frac{k-1}{3-2} = \tan 45°$

$\therefore k - 1 = 1$ $\therefore k = 2$

[b] $\because$ The straight line passes through (2 , 0) , (0 , 4)

$\therefore$ Its slope $= \frac{4-0}{0-2} = -2$

$\therefore$ Its equation is : $y = -2X + c$

, $\because$ the straight line intercepts 4 units from the positive part of y-axis

$\therefore$ Its equation is : $y = -2X + 4$

24 South Sinai

1

1 a 2 b 3 c 4 d 5 a 6 c

2

[a] $\because \cos 60° = \frac{1}{2}$ (1)

, $\cos^2 30° - \sin^2 30° = \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{1}{2}\right)^2 = \frac{1}{2}$ (2)

From (1) , (2) : $\therefore \cos 60° = \cos^2 30° - \sin^2 30°$

[b] Let B (x , y)

$\therefore (1 , -3) = \left(\frac{4+x}{2} , \frac{-3+y}{2}\right)$

$\therefore \frac{4+x}{2} = 1$ $\therefore 4 + x = 2$ $\therefore x = -2$

, $\frac{-3+y}{2} = -3$ $\therefore -3 + y = -6$ $\therefore y = -3$

$\therefore$ B $(-2 , -3)$

3

[a] $\because$ The slope of the straight line $= \frac{-3-3}{-1-1} = 3$

$\therefore$ Its equation is : $y = 3x + c$

, $\because$ (1 , 3) satisfies the equation.

$\therefore 3 = 3 \times 1 + c$ $\therefore c = 0$

$\therefore$ The equation is : $y = 3x$

[b] $\because AB = \sqrt{(1-3)^2 + (5-3)^2} = \sqrt{4+4}$

$= 2\sqrt{2}$ length units

, $BC = \sqrt{(1-1)^2 + (3-5)^2} = \sqrt{4}$

$= 2$ length units

, $AC = \sqrt{(1-3)^2 + (3-3)^2} = \sqrt{4} = 2$ length units

$\therefore BC = AC$

$\therefore \Delta ABC$ is an isosceles triangle.

4

[a] $\because$ The slope of the straight line = $\tan 45° = 1$

$\therefore$ Its equation is : $y = x + c$

, $\because$ (– 2 , 3) satisfies the equation.

$\therefore 3 = -2 + c$ $\therefore c = 5$

$\therefore$ The equation is : $y = x + 5$

[b] $\frac{2 \tan 45°}{1 + \tan^2 45°} = \frac{2 \times 1}{1 + (1)^2} = 1$

5

[a] $\because$ The slope of the straight line is 2 and it intersects 5 units from the positive part of the y-axis

$\therefore$ Its equation is : $y = 2x + 5$

[b] 1 $\because m(\angle B) = 90°$ $\therefore \sin C = \frac{5}{10} = \frac{1}{2}$

$\therefore m(\angle C) = 30°$

2 $\sin^2 C + \cos^2 C = \sin^2 30° + \cos^2 30°$

$= \left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 = 1$

25 North Sinai

1

1 d 2 c 3 a 4 c 5 d 6 c

2

[a] $\because \cos 60° = \frac{1}{2}$ (1)

, $2\cos^2 30° - 1 = 2 \times \left(\frac{\sqrt{3}}{2}\right)^2 - 1$

$= 2 \times \frac{3}{4} - 1 = \frac{1}{2}$ (2)

From (1) , (2) : $\therefore \cos 60° = 2\cos^2 30° - 1$

[b] $\because AB = \sqrt{(-4-1)^2 + (2+2)^2} = \sqrt{25+16}$

$= \sqrt{41}$ length units

, $BC = \sqrt{(1+4)^2 + (6-2)^2} = \sqrt{25+16}$

$= \sqrt{41}$ length units

, $AC = \sqrt{(1-1)^2 + (6+2)^2} = \sqrt{64}$

$= 8$ length units

$\therefore AB = BC$

$\therefore \Delta ABC$ is an isosceles triangle.

3

[a] $\because$ The slope of the straight line = 2 and it cuts 7 units from the positive part of the y-axis

$\therefore$ Its equation is : $y = 2x + 7$

[b] 1 $\because m(\angle B) = 90°$

$\therefore (AB)^2 = (10)^2 - (8)^2 = 36$

$\therefore AB = 6$ cm.

2 $\sin^2 A + \cos^2 A = \left(\frac{8}{10}\right)^2 + \left(\frac{6}{10}\right)^2$

$= \frac{64}{100} + \frac{36}{100} = 1$

4

[a] $\because \cos x = \frac{\sin 60° \sin 30°}{\sin^2 45°}$ $\quad \therefore \cos x = \frac{\frac{\sqrt{3}}{2} \times \frac{1}{2}}{\left(\frac{1}{\sqrt{2}}\right)^2}$

$\therefore \cos x = \frac{\sqrt{3}}{2}$ $\quad \therefore x = 30°$

[b] $\because$ The slope of the given straight line $= \frac{-4+3}{5-2}$

$= \frac{-1}{3}$

$\therefore$ The slope of the required straight line = 3

$\therefore$ Its equation is : $y = 3x + c$

, $\because$ (1 , 2) satisfies the equation.

$\therefore 2 = 3 \times 1 + c$ $\quad \therefore c = -1$

$\therefore$ The equation is : $y = 3x - 1$

5

1 $\because MA = \sqrt{(-1-3)^2 + (2+1)^2} = \sqrt{16+9}$

= 5 length units

, $MB = \sqrt{(-1+4)^2 + (2-6)^2} = \sqrt{9+16}$

= 5 length units

and $MC = \sqrt{(-1-2)^2 + (2+2)^2} = \sqrt{9+16}$

= 5 length units

$\therefore MA = MB = MC$

$\therefore$ A , B and C lie on the circle M

2 The circumference of the circle $= 2 \times 3.14 \times 5$

= 31.4 length units.

26 Red Sea

1

1 b 2 c 3 a 4 c 5 b 6 d

2

[a] $\because \sin 60° = \frac{\sqrt{3}}{2}$ (1)

, $2 \sin 30° \cos 30° \tan 45° = 2 \times \frac{1}{2} \times \frac{\sqrt{3}}{2} \times 1$

$= \frac{\sqrt{3}}{2}$ (2)

From (1) , (2) :

$\therefore \sin 60° = 2 \sin 30° \cos 30° \tan 45°$

[b] $\because$ The slope of the straight line $= \frac{-1-2}{-2-4} = \frac{1}{2}$

$\therefore$ Its equation is : $y = \frac{1}{2}x + c$

, $\because$ (4 , 2) satisfies the equation.

$\therefore 2 = \frac{1}{2} \times 4 + c$ $\quad \therefore c = 0$

$\therefore$ The equation is : $y = \frac{1}{2}x$

3

[a] $\because \tan x = 4 \cos 60° \sin 30°$

$\therefore \tan x = 4 \times \frac{1}{2} \times \frac{1}{2}$

$\therefore \tan x = 1$ $\quad \therefore x = 45°$

[b] $\because AB = \sqrt{(-3-2)^2 + (0-4)^2} = \sqrt{25+16}$

$= \sqrt{41}$ length units

, $BC = \sqrt{(-7+3)^2 + (5-0)^2} = \sqrt{16+25}$

$= \sqrt{41}$ length units

, $AC = \sqrt{(-7-2)^2 + (5-4)^2} = \sqrt{81+1}$

$= \sqrt{82}$ length units

$\therefore (AC)^2 = (AB)^2 + (BC)^2$

$\therefore \Delta ABC$ is a right-angled triangle at B

, its area $= \frac{1}{2} \times \sqrt{41} \times \sqrt{41} = 20\frac{1}{2}$ square units.

4

[a] $\because$ The slope of the straight line = 2 and it intercepts 7 units from the positive part of the y-axis

$\therefore$ Its equation is : $y = 2x + 7$

[b] $\because m(\angle B) = 90°$

$\therefore (AB)^2 = (13)^2 - (5)^2 = 144$

$\therefore AB = 12$ cm.

$\therefore \sin A \cos C + \cos A \sin C$

$= \frac{5}{13} \times \frac{5}{13} + \frac{12}{13} \times \frac{12}{13} = 1$

5

[a] $\because \sqrt{(x+2)^2 + (7-3)^2} = 5$ (Squaring both sides)

$\therefore (x+2)^2 + (7-3)^2 = 25$

$\therefore x^2 + 4x + 4 + 16 - 25 = 0$

$\therefore x^2 + 4x - 5 = 0$ $\quad \therefore (x+5)(x-1) = 0$

$\therefore x = -5$ or $x = 1$

[b] $\because L_1 \parallel L_2$ $\therefore m_1 = m_2$

$\therefore \frac{k-1}{2-3} = \tan 45°$ $\therefore -k+1 = 1$

$\therefore k = 0$

27 Matrouh

1

1 b 2 a 3 a 4 c 5 a 6 d

2

[a] $\because \tan 60° = \sqrt{3}$ (1)

$, \frac{2 \tan 30°}{1 - \tan^2 30°} = \frac{2 \times \frac{1}{\sqrt{3}}}{1 - \left(\frac{1}{\sqrt{3}}\right)^2} = \frac{\frac{2}{\sqrt{3}}}{1 - \frac{1}{3}} = \sqrt{3}$ (2)

From (1) , (2) :

$\therefore \tan 60° = \frac{2 \tan 30°}{1 - \tan^2 30°}$

[b] $\because$ The slope of $\overleftrightarrow{AB} = m_1 = \frac{-4-0}{2-6} = 1$

, the slope of $\overleftrightarrow{BC} = m_2 = \frac{2+4}{-4-2} = -1$

$\therefore m_1 \times m_2 = 1 \times -1 = -1$

$\therefore \overleftrightarrow{AB} \perp \overleftrightarrow{BC}$

$\therefore \Delta$ ABC is a right-angled triangle at B

3

[a] $\because \sqrt{(a+2)^2 + (7-3)^2} = 5$ (Squaring both sides)

$\therefore (a+2)^2 + (7-3)^2 = 25$

$\therefore a^2 + 4a + 4 + 16 - 25 = 0$

$\therefore a^2 + 4a - 5 = 0$ $\therefore (a+5)(a-1) = 0$

$\therefore a = -5$ or $a = 1$

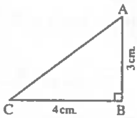
[b] $\because m(\angle B) = 90°$

$\therefore (AC)^2 = (3)^2 + (4)^2 = 25$

$\therefore AC = 5$ cm.

$\therefore \sin A \cos C + \cos A \sin C$

$= \frac{4}{5} \times \frac{4}{5} + \frac{3}{5} \times \frac{3}{5} = 1$



4

[a] Let $A = x°$, $B = 2x°$

$\therefore x + 2x = 90°$ $\therefore 3x = 90°$

$\therefore x = 30°$ $\therefore A = 30°$, $B = 60°$

$\therefore \sin A + \cos B = \sin 30° + \cos 60°$

$= \frac{1}{2} + \frac{1}{2} = 1$

[b] $\because \frac{x}{2} + \frac{y}{2} = 1$ (Multiplying by 2)

$\therefore x + y = 2$

$\therefore$ The slope $= -1$

, the intercepted part = 2 units from the positive part of y-axis.

5

[a] $\because (-3 , y) = \left(\frac{x+9}{2} , \frac{-6-12}{2}\right)$

$\therefore y = -9$

$, \frac{x+9}{2} = -3$ $\therefore x + 9 = -6$

$\therefore x = -15$

[b] $\because$ The slope of the given straight line $= \frac{-1}{2}$

$\therefore$ The slope of the required straight line $= \frac{-1}{2}$

$\therefore$ Its equation is : $y = \frac{-1}{2} x + c$

, $\because (3 , -5)$ satisfies the equation.

$\therefore -5 = \frac{-1}{2} \times 3 + c$ $\therefore c = \frac{-7}{2}$

$\therefore$ The equation is : $y = \frac{-1}{2} x - \frac{7}{2}$